

How to Build and Load Programming in
LabVIEW, C, and Java
2011 FRC – *LogoMotion*

How to Build and Load Programming in LabVIEW, C/C++, and Java

Teams should only read the section for the programming language they have chosen.

How to Build and Load a LabVIEW Program

Configuring an FRC Robot Project

- 1) Launch LabVIEW.
- 2) Click the FRC cRIO Robot Project link in the Getting Started window to display the Create New FRC Robot Project dialog box.
- 3) In the Project name text box, enter the name you want to use to identify the new FRC robot project.
- 4) In the Project folder text box, enter the location on the host machine to which you want to save the project files and VIs.
- 5) 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. You can use the cRIO Imaging Tool to set the IP address of the cRIO.
- 6) Click the Finish button to close the Create New FRC Robot Project dialog box and create the new FRC robot project. LabVIEW displays the new FRC robot project in the Project Explorer window.

Running the FRC Robot Project

You can deploy the FRC robot project to the cRIO before making any modifications. In the Project Explorer window, right-click the Robot Main.vi item and select Run from the shortcut menu. LabVIEW deploys the Robot Main VI and any support files for the VI to the cRIO. The Robot Main VI then runs on the cRIO. If the robot has a joystick connected to port 1 of the driver station and Jaguar motor controllers controlling the two wheels, you can move the joysticks and observe how the robot responds.

You also can run the FRC robot project on the cRIO and maintain a connection with the host computer to perform live front panel programming and debugging. By maintaining a connection with the host computer, you can monitor indicators and observe how changes to the front panel of VIs affect the behavior of the robot.

Complete the following steps to run the FRC robot project and perform live front panel debugging.

- 1) In the Project Explorer window, double-click the Robot Main.vi item to open the Robot Main VI.
- 2) Click the Run button 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) Move the joysticks and observe how the robot responds.
- 4) 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.

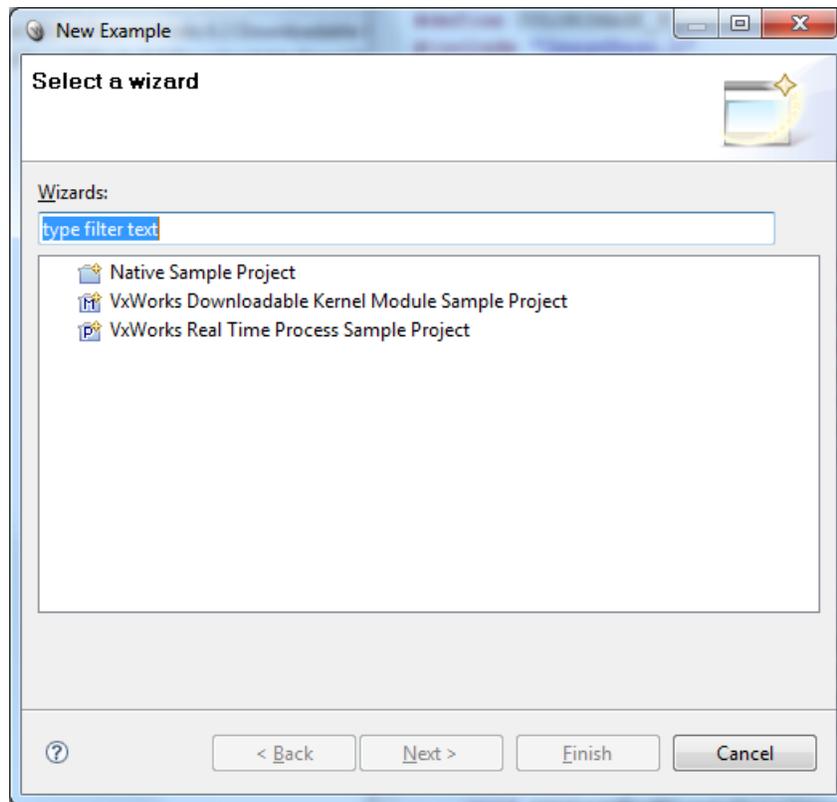
If you redeploy the Robot Main VI with the Run button, the cRIO stops and restarts the Robot Main VI. LabVIEW redeploys any VIs that changed or are no longer in memory on the cRIO.

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 Robotics Programming Guide link on the LabVIEW Getting Started window, by navigating to the National Instruments\LabVIEW 8.6\manuals directory and opening FRC_Getting_Started.pdf, or by searching ni.com.

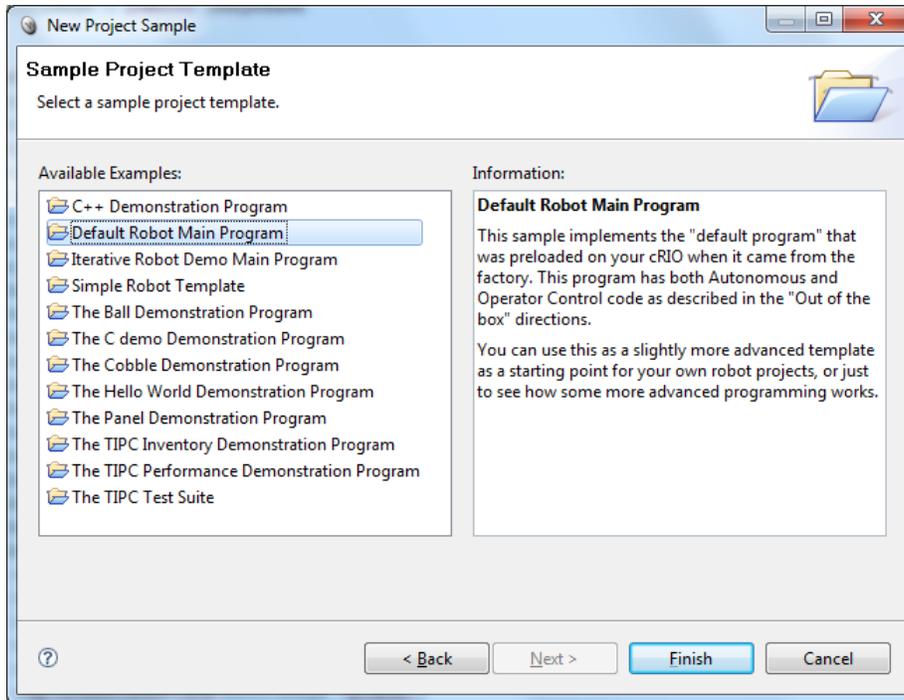
How to build and load a C/C++ program

Creating the sample program

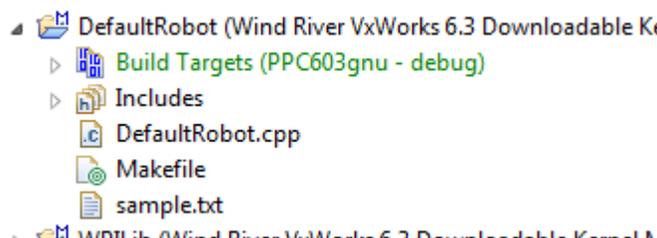
- 1) Launch WindRiver Workbench using the desktop shortcut.
- 2) Select “New” then “Example...” from the File menu.
- 3) Choose “VxWorks Downloadable Kernel Module Sample Project” and click “Next>”.



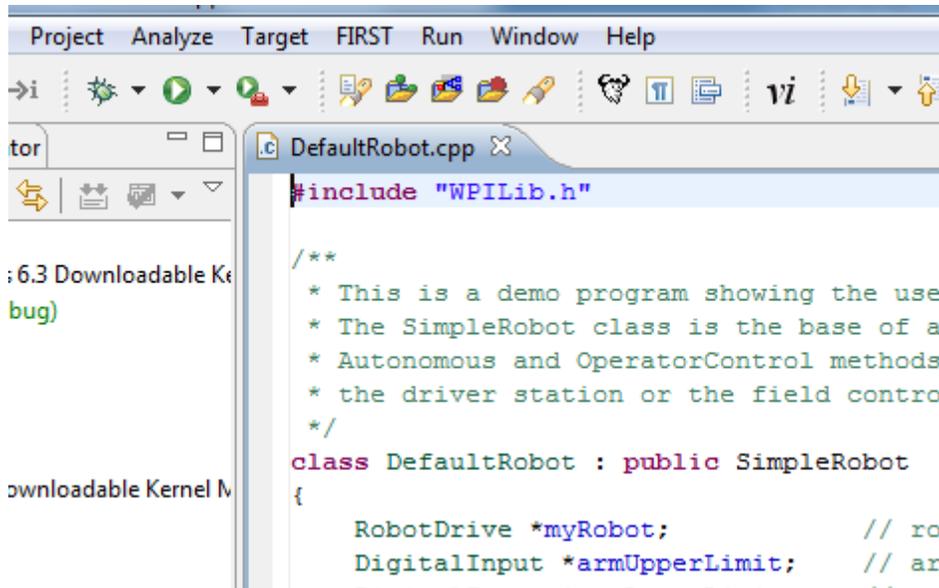
- 4) Choose “Default Robot Main Program” from the list of choices presented and then click “Finish”.



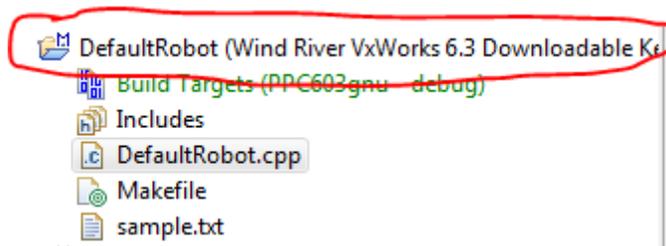
- 5) Notice that the project is now loaded into the Project Explorer tab on the left panel of Workbench.



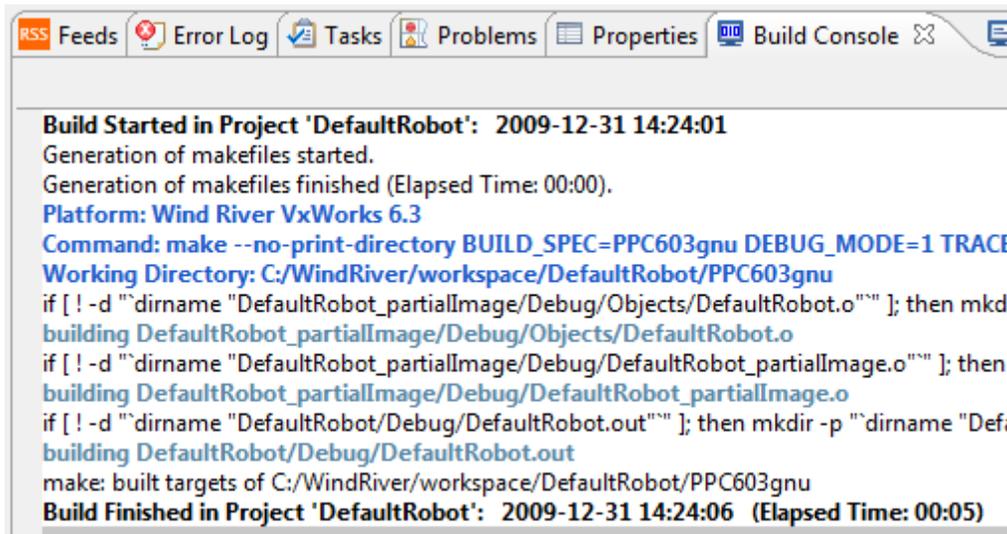
- 6) If you double-click on the "DefaultRobot.cpp" file name in the Project Explorer, you'll see the C++ source code in a tab in the main window in Workbench.



- 7) To build the program, right-click on the project name in the project explorer and select “Build Project” from the pop-up context menu.



- 8) You should see the results of the build in the “Build Console” tab at the bottom of the Workbench window. If you don’t see these results, exit from Workbench and restart it, then rebuild the project.



Downloading the program

- 1) Set up your team number in Workbench so it can find your robot. To do this, select “Window” and then “Preferences” from the main menu.
- 2) On the preferences window select “FIRST downloader preferences”. Then fill in your team number and the file to download to the robot. It will likely be:
C:\WindRiver\workspace\DefaultRobot\PPC603gnu\DefaultRobot\Debug\DefaultRobot.out You can use the “Browse...” button to find it.
Once done these settings don’t need to be changed until you decide to work on a different project.
- 3) To download the program click on “FIRST” and then “download” from the Main menu in Workbench. If the cRIO is properly set up, the file will be downloaded.

Running the program

Reboot the cRIO to run the program and then proceed to section 2.9 to verify basic teleoperated and autonomous control of the robot. The steps here are described in more detail in the C/C++ Getting Started Guide available in: C:\WindRiver\docs\extensions or at:

<http://first.wpi.edu/FRC/frcupdates.html>.

How to build and load a Java program

Creating the BuiltInDefaultCode Project

- 1) Launch NetBeans.
- 2) Select “File > New Project...”.
- 3) In the New Project Dialog, browse to “Samples > FRC Java”.
- 4) Select “DefaultCodeProject.zip”
- 5) Click “Next >”
- 6) Click “Finish”

NetBeans displays the new BuiltInDefaultCode project in the Projects window.

Building and Running the BuiltInDefaultCode Project

You can build and deploy the BuiltInDefaultCode project to the cRIO before making any modifications. Before starting insure that the computer you’re using for software development is connected and configured with the correct IP address as instructed in Section 2.6. If you are using the Classmate Driver Station for software development, the IP address should already be correctly set. If you are use another computer for software development, its IP address should be set to an address that doesn’t conflict with the Classmate, robot or wireless bridge, such as 10.xx.yy.6 or 10.xx.yy.10 (where xxyy is your team number). Complete the following steps to build and run the default code:

- 1) Right-Click on the BuiltInDefaultCode project name.
- 2) Select “Set as Main Project” from the pop-up menu.
- 3) Click the green “Run Main Project” arrow in the NetBeans toolbar.

The BuiltInDefaultCode will build, load and run on the cRIO. You can proceed to “Basic Operator Control” to verify basic teleoperated and autonomous control of the robot. Note that you may want to uncomment the autonomous code in BuiltInDefaultCode before building and testing.