



The Robodox Guide to Multiple Cameras in FRC



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Granada Hills Charter High School Robotics Team

[Introduction](#)

This guide was written by FRC team 599, the Robodox, to help teams use multiple cameras on their robots. We used an Axis M1011 Network Camera; however this guide should also work for the Axis 206 Network Camera.

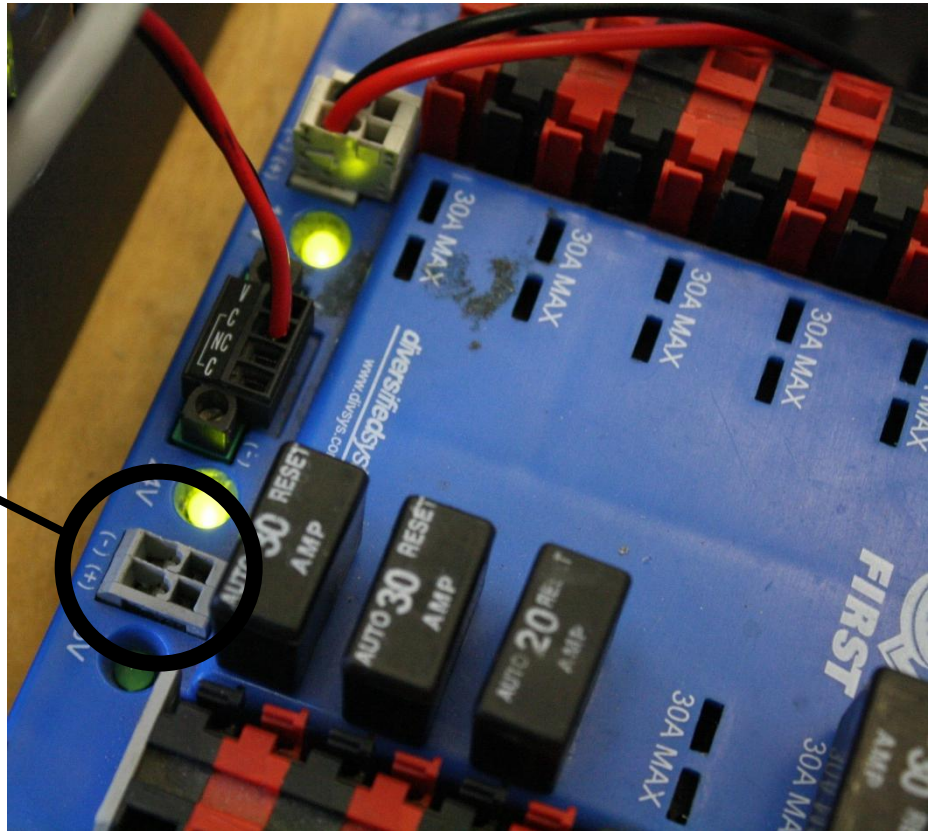
When referring to other parts of the guide in the instructions you will see them in the format of Chapter.Section.Step. For example, 1.2.1 refers to Chapter 1, Section 2, Step 1.

Chapter 1

Powering Multiple Cameras

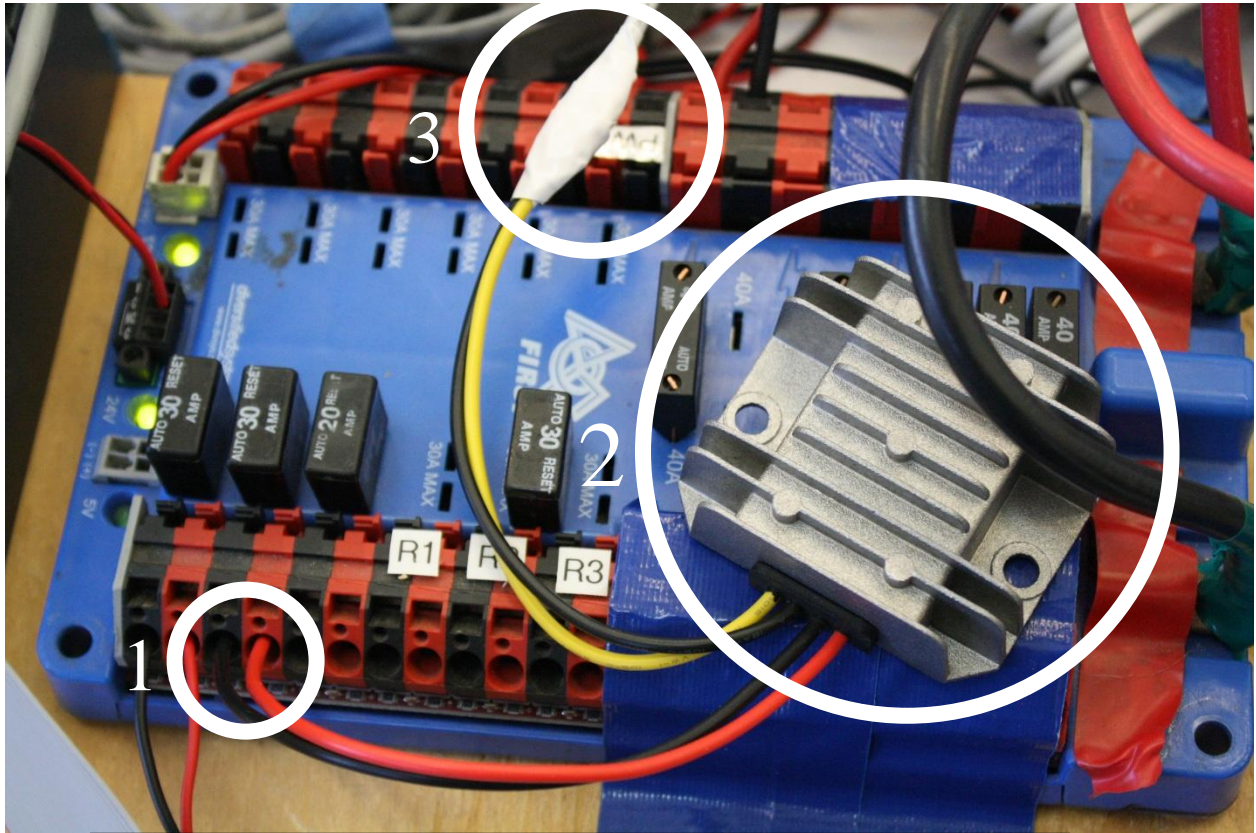
1. Power one camera normally out of the 5V Wago port on the power distribution board.

5V Wago for camera



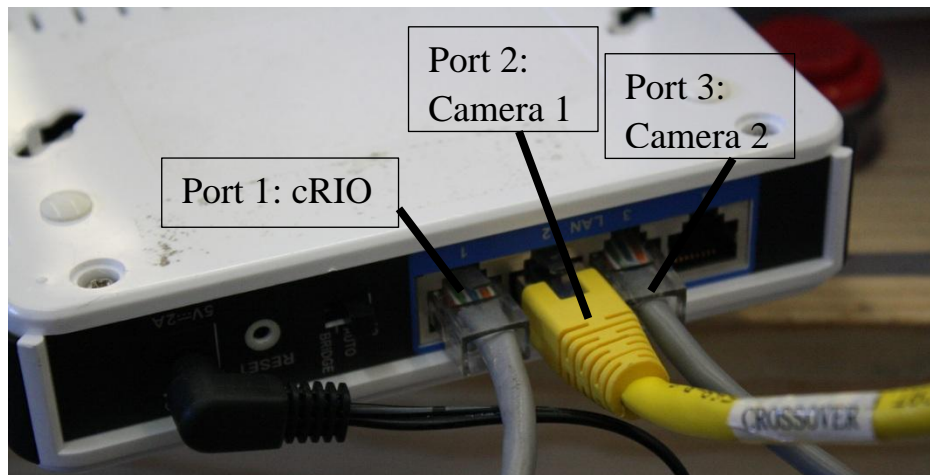
2. The second camera can be powered using the converter provided in the Kit of Parts (KOP) to go from a 12V port to the camera. The converter is normally used for the radio so if you don't have a second one you need to get one somehow. We have two because we have one from last year's KOP.

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1. 12V port that the converter goes into
2. Converter that comes in the KOP
3. Connection between converter and camera wire

3. Now connect both cameras to the radio (D-Link DAP-1522) using an Ethernet cable.



Chapter 2

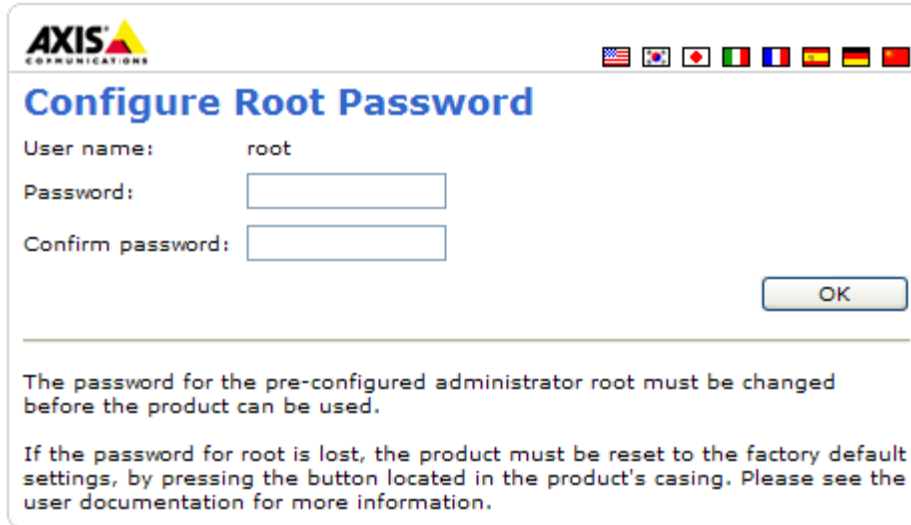
Setting Up Multiple Cameras

Section 1: Setting Up First Camera

1. First, reset your Axis camera. To do this unplug it, hold down the reset button on the back and then plug in power. Keep holding the button until the orange light on the front turns on.
2. Power the camera and connect it directly to your PC using a crossover cable. Go to your computer's Local Area Connection TCP/IPv4 and set the IP address to 192.168.0.11 and Subnet Mask 255.255.255.0.
3. Run the Setup Axis Camera tool installed with the LabVIEW FRC. Select Robot Radio and enter your team number. Once the camera is found click apply.
4. Now the IP address of the first camera is 10.te.am.11.
5. Don't forget to change your computer's IP address to 10.te.am.6 so that your computer recognizes the camera.

Section 2: Setting Up Second Camera

1. Repeat the instruction for setting up the first camera.
2. Now go to an internet browser and go to 10.te.am.11. When prompted enter FRC in both fields and click OK.



AXIS
COMMUNICATIONS

Configure Root Password

User name: root

Password:

Confirm password:

OK

The password for the pre-configured administrator root must be changed before the product can be used.

If the password for root is lost, the product must be reset to the factory default settings, by pressing the button located in the product's casing. Please see the user documentation for more information.

3. You will see another login window pop up. Enter FRC in both fields again.



Connect to 192.168.0.90

The server 192.168.0.90 at / requires a username and password.

Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).

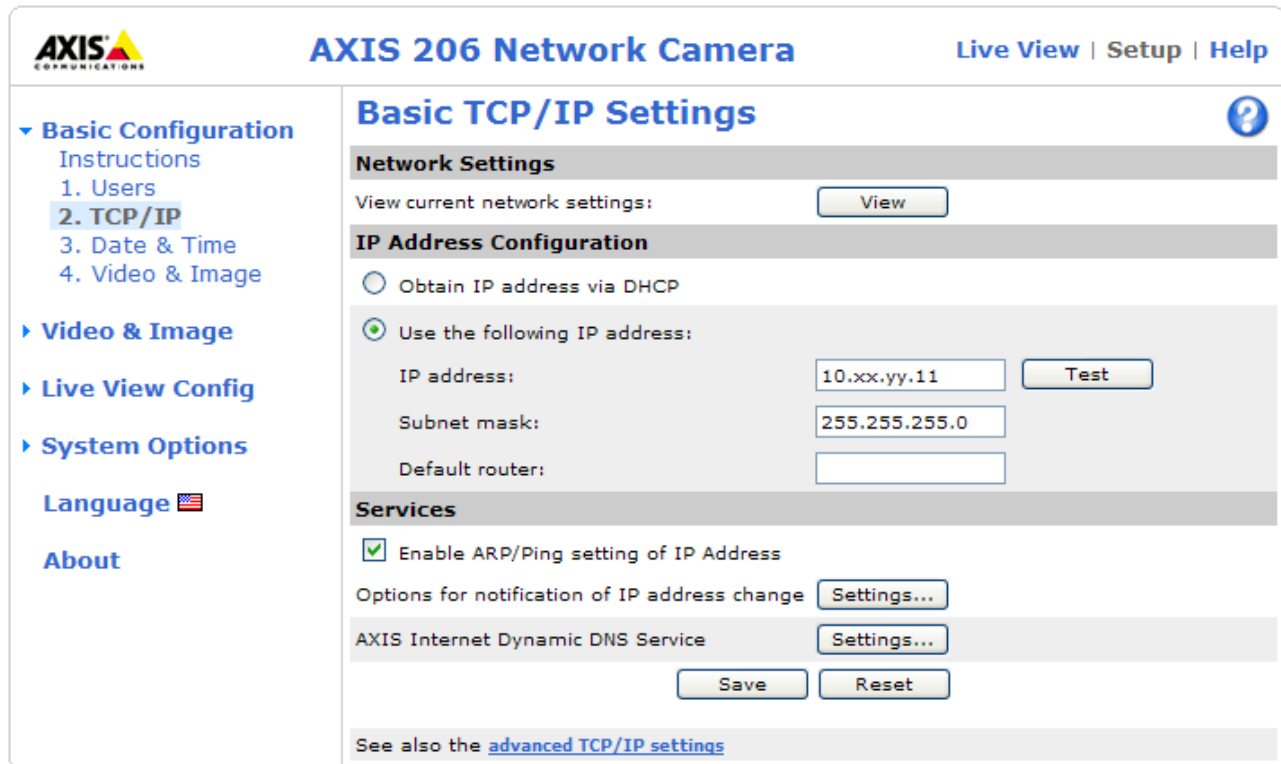
User name:

Password:

☐ Remember my password

OK Cancel

4. Now you should see live feed from your camera.
5. In the upper right corner of the web page, click **Setup** to access the camera's settings. Under the **Basic Configuration** heading, click **TCP/IP**. As shown below, enter 10.te.am.12 for the IP address. Delete any text from the **Default router** field, so your page matches the one shown below. Then click save.



The screenshot shows the web interface for an AXIS 206 Network Camera. The top navigation bar includes the AXIS logo, the title 'AXIS 206 Network Camera', and links for 'Live View', 'Setup', and 'Help'. The left sidebar contains a 'Basic Configuration' menu with options: 'Instructions', '1. Users', '2. TCP/IP' (highlighted), '3. Date & Time', and '4. Video & Image'. Below this are 'Video & Image', 'Live View Config', 'System Options', 'Language' (with a US flag), and 'About'. The main content area is titled 'Basic TCP/IP Settings' and includes a help icon. It is divided into three sections: 'Network Settings' with a 'View' button; 'IP Address Configuration' with radio buttons for 'Obtain IP address via DHCP' and 'Use the following IP address:' (selected). The latter section has input fields for 'IP address:' (containing '10.xx.yy.11'), 'Subnet mask:' (containing '255.255.255.0'), and 'Default router:' (empty), along with a 'Test' button. The 'Services' section has a checked checkbox for 'Enable ARP/Ping setting of IP Address', a 'Settings...' button for 'Options for notification of IP address change', and another 'Settings...' button for 'AXIS Internet Dynamic DNS Service'. At the bottom are 'Save' and 'Reset' buttons. A footer note says 'See also the [advanced TCP/IP settings](#)'.

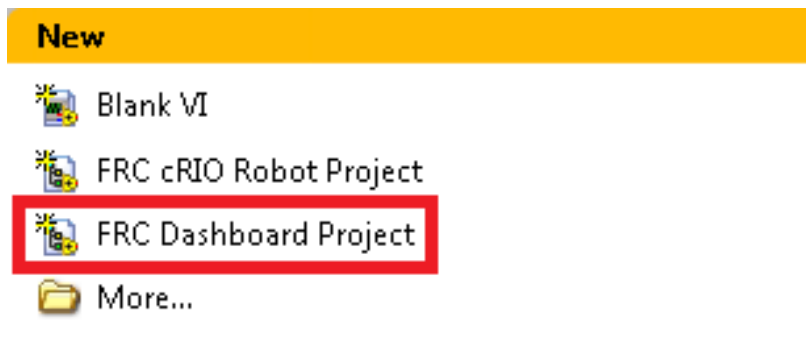
6. You can repeat this process to have more than two cameras and changing the IP address to 10.te.am.xx where xx is a number between 11 and 20.

Chapter 3

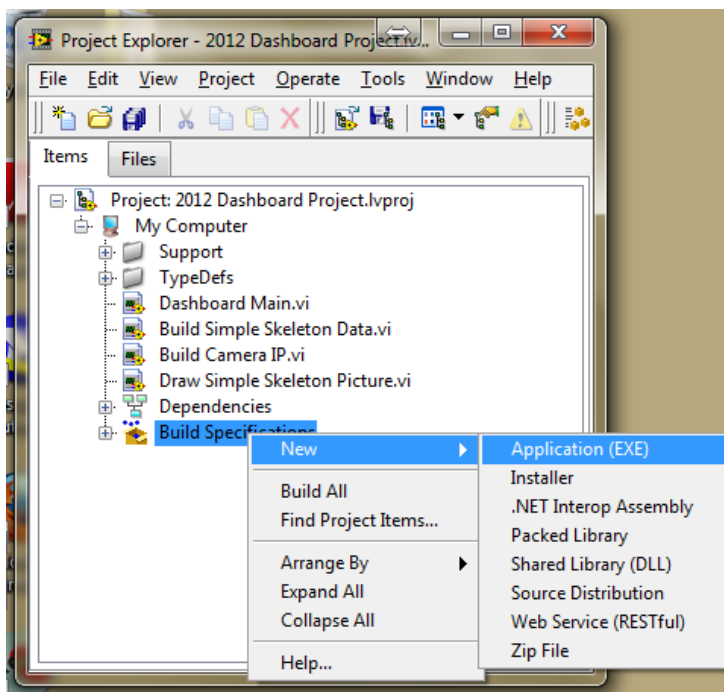
Multiple Cameras in FRC Dashboard

Section 1: Creating the Project

1. Make sure you have LabVIEW and the LabVIEW Programming Update. To download the update go to <http://joule.ni.com/nidu/cds/view/p/id/2261>
2. Open LabVIEW and start a new FRC Dashboard Project



3. Make the project an application (.exe) by right-clicking on “Build Specifications” then “New” then “Application (EXE)”.

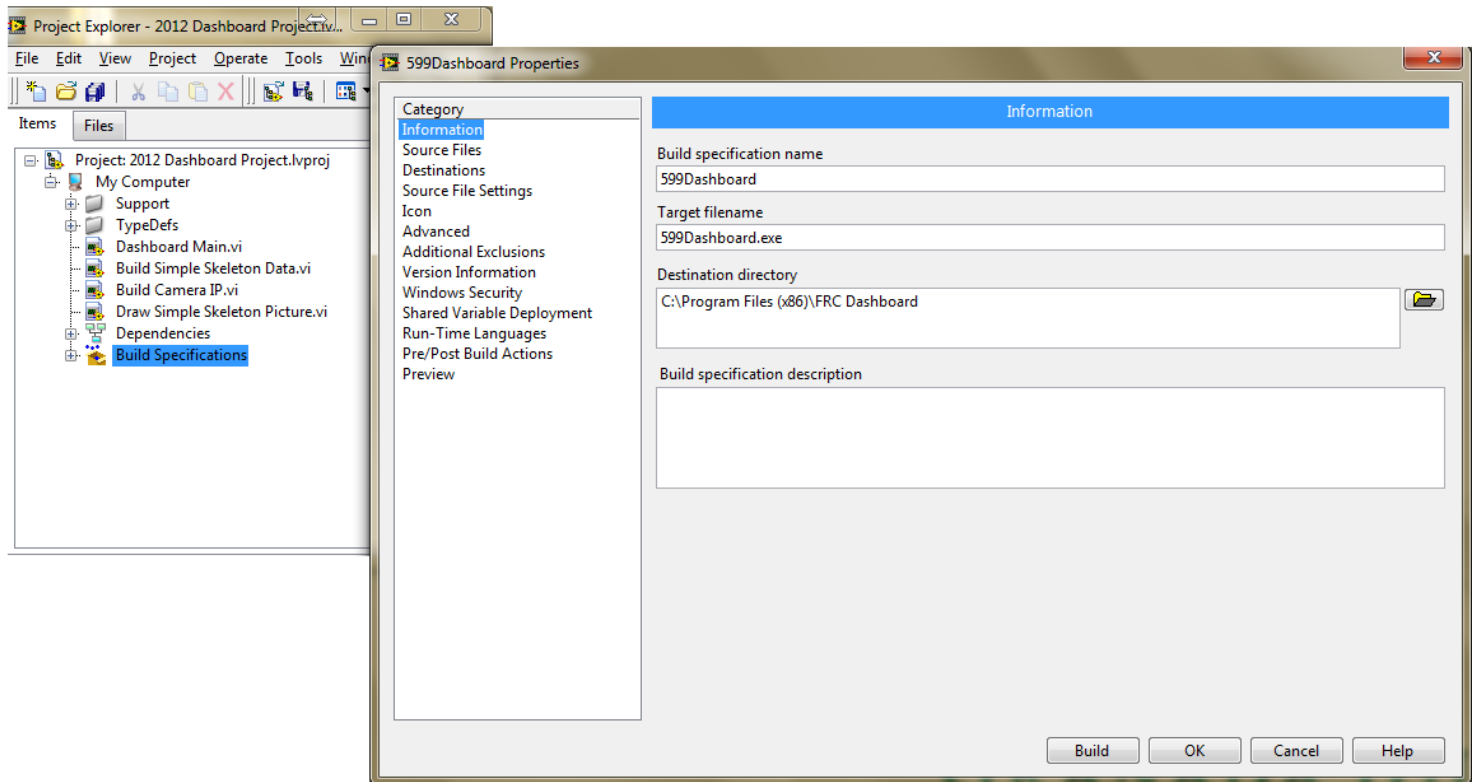


4. Fill out the information in the popup window

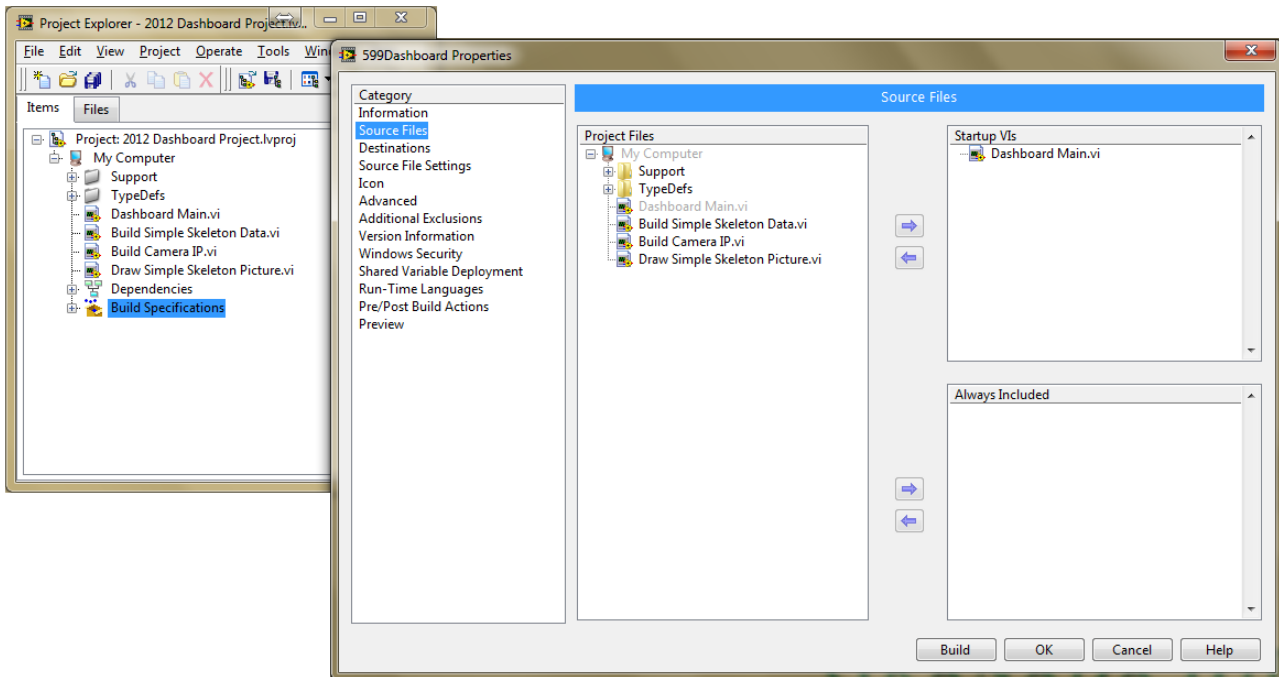
- Build Specification Name: anything ex. *599Dashboard*
- Target filename: ex. *599Dashboard.exe*
- Destination Directory:

Windows 32-bit: C:\Program Files\FRC Dashboard

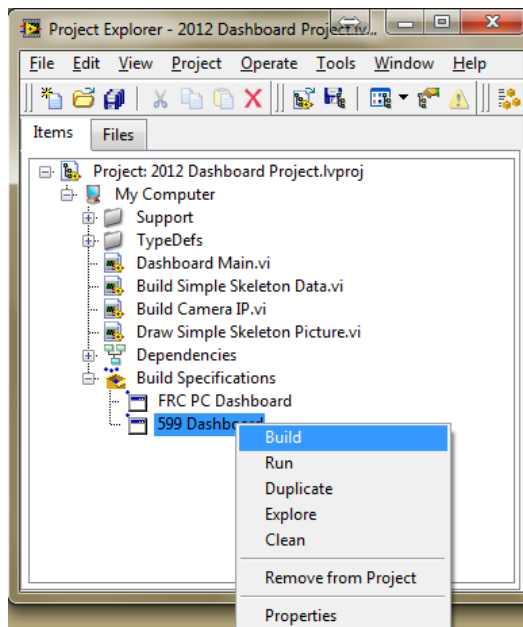
Windows 64-bit: C:\Program Files (x86)\FRC Dashboard



5. Click “Source Files” in the left column, the click on “Dashboard Main.vi”, and click the right pointing arrow towards “Startup VIs”. You should now see “Dashboard Main.vi” in “Startup VIs”. Then click on “Build” at the bottom of the window.

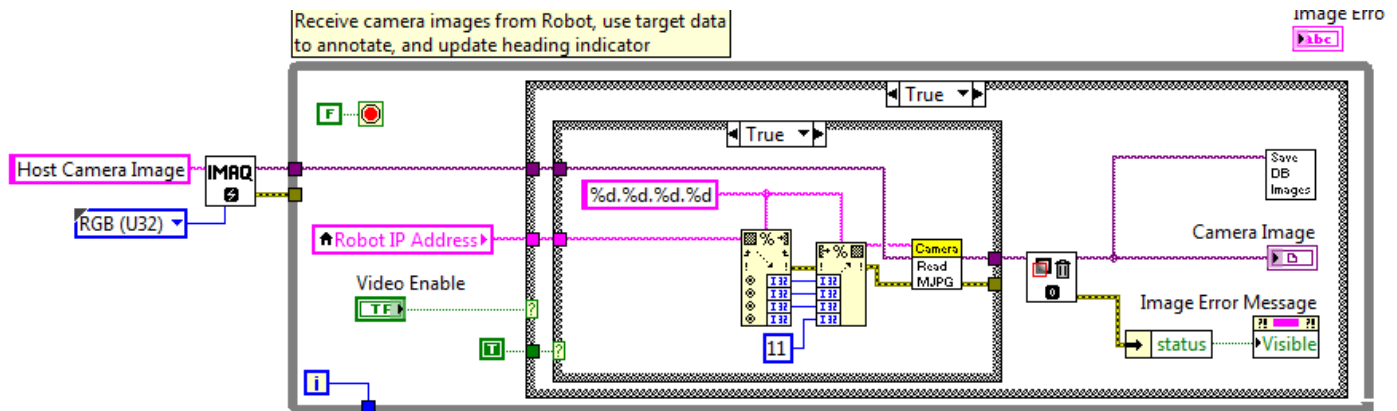


6. When you make code changes, build by right-clicking on your application under Build Specifications and clicking on “Build”.

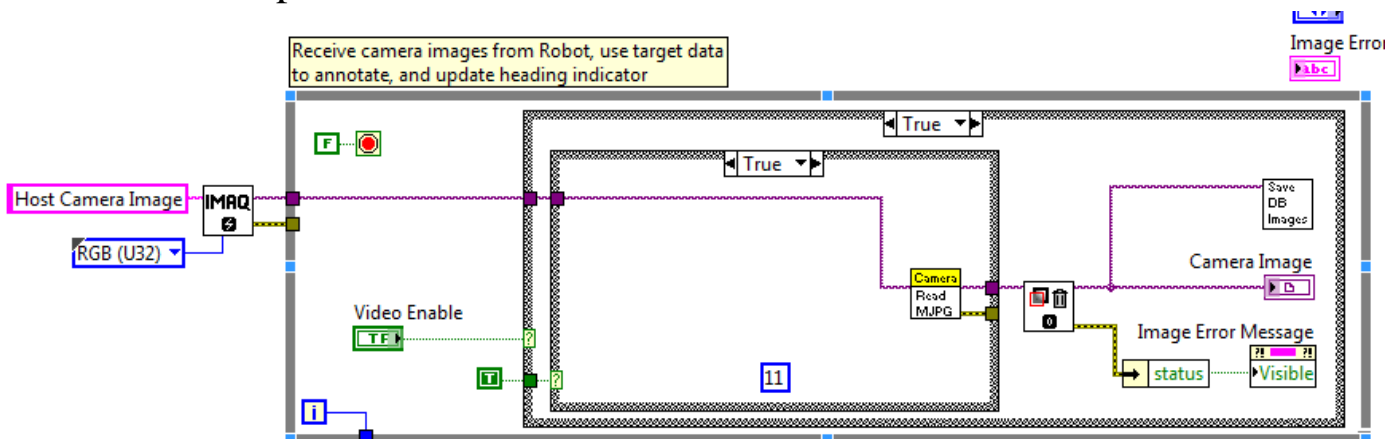


Section 2: Coding the First Camera

1. Double click on “Dashboard Main.vi” and go to “Window” in the toolbar and click on “Show Block Diagram”. Go to this piece of code.

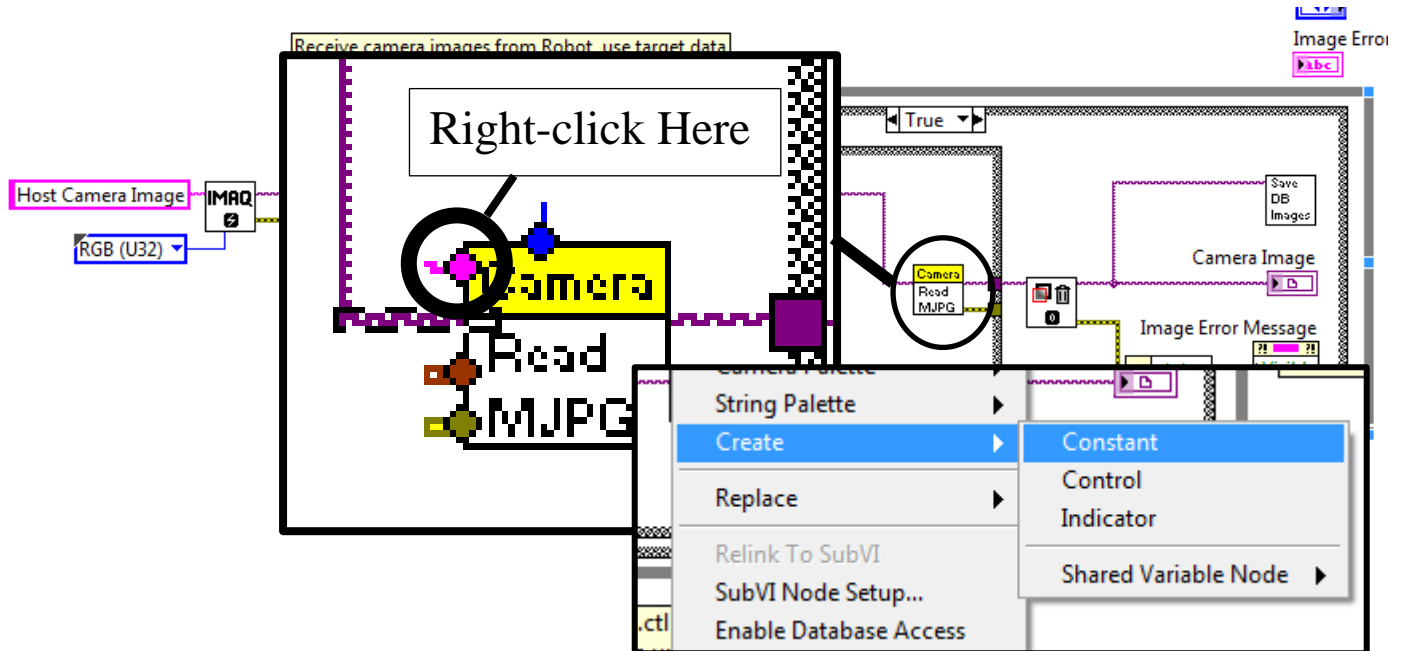


2. Delete the necessary pieces of code to make the above picture look like the picture below.

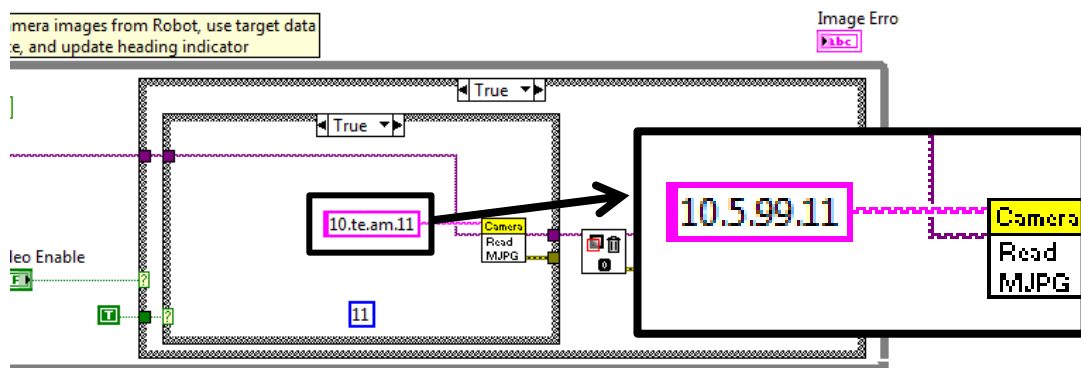


3. Make sure your camera is connected and recognized by your computer before continuing. Go to the Local Area Connection TCP/IPv4 of your computer and make sure the IP address is set to 10.te.am.6 and the Subnet Mask is set to 255.255.255.0

- Now right click on the specified area below and click on “Create” and then “Constant”.



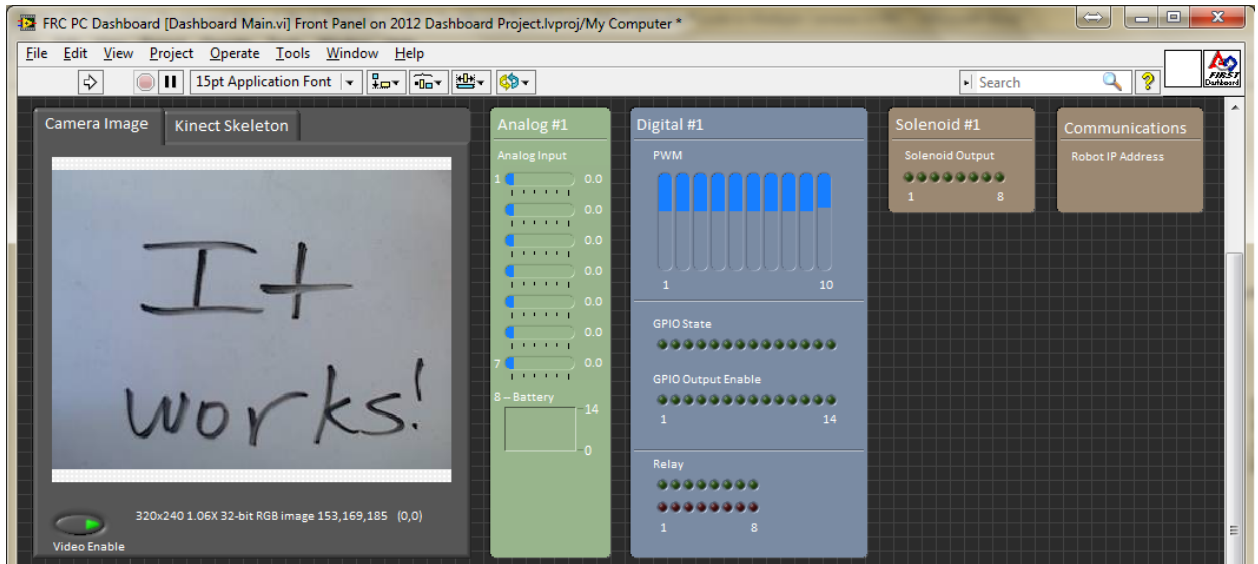
- You should see 10.te.am.11. Replace the te.am with your team number.



- Now test to see if your camera is working by running the program and looking back at the front panel.

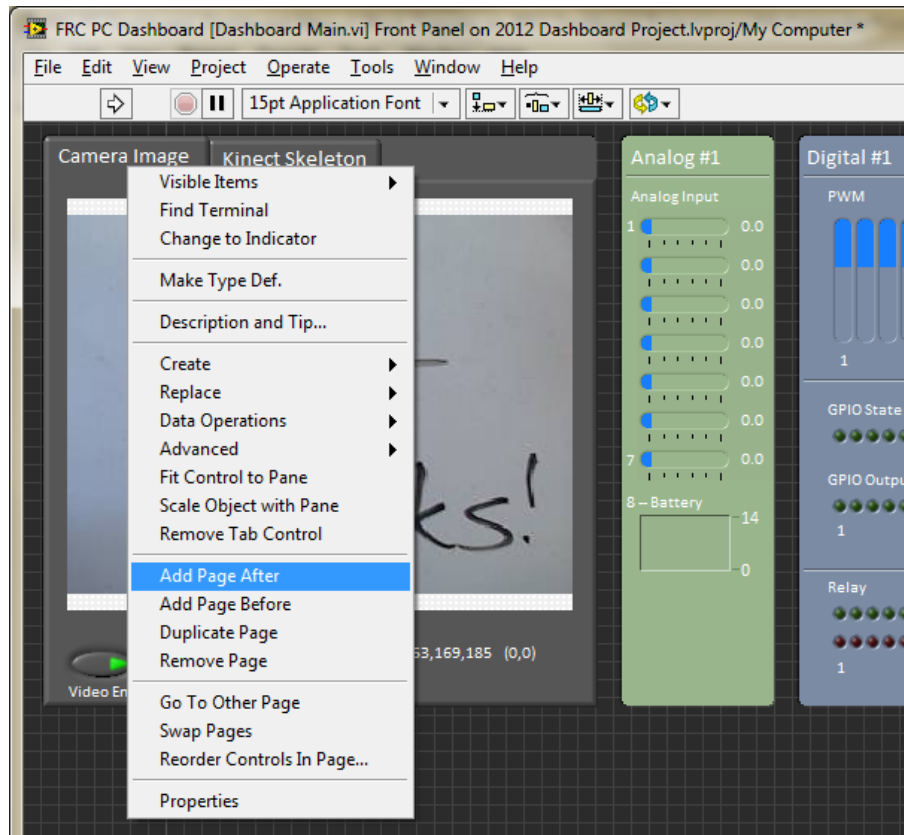


7. You should see an image on the front panel.



Section 3: Coding the Second Camera

1. You have to create a new tab on the dashboard. To do this click on the tab that says “Camera Image” and then click on “Add Page After”.



2. Now you should have two tabs. You can rename them by double clicking on the name, or you can keep them the same.

- Back in the Block Diagram, highlight everything in the camera loop, copy, and paste it. Change the IP to the second camera's IP, change "Host Camera Image" to "Host Camera Image 2", "Video Enable" to "Video Enable 2", "Camera Image" to "Camera Image 2", and "Image Error Message" to "Image Error Message 2".

Copy all of this

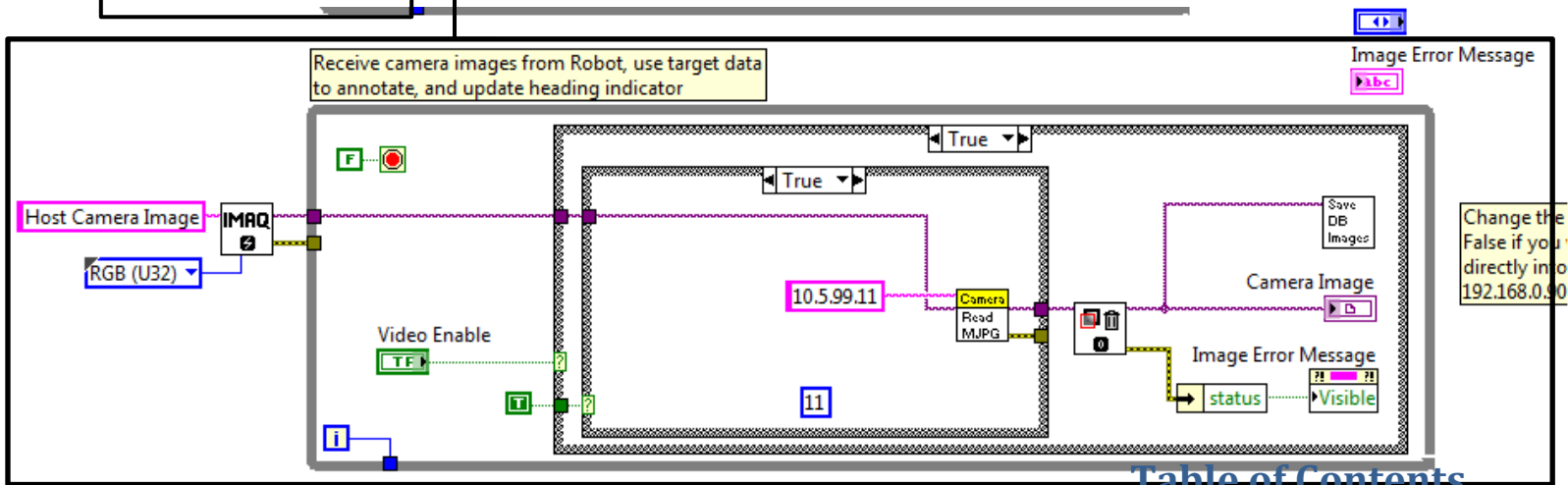
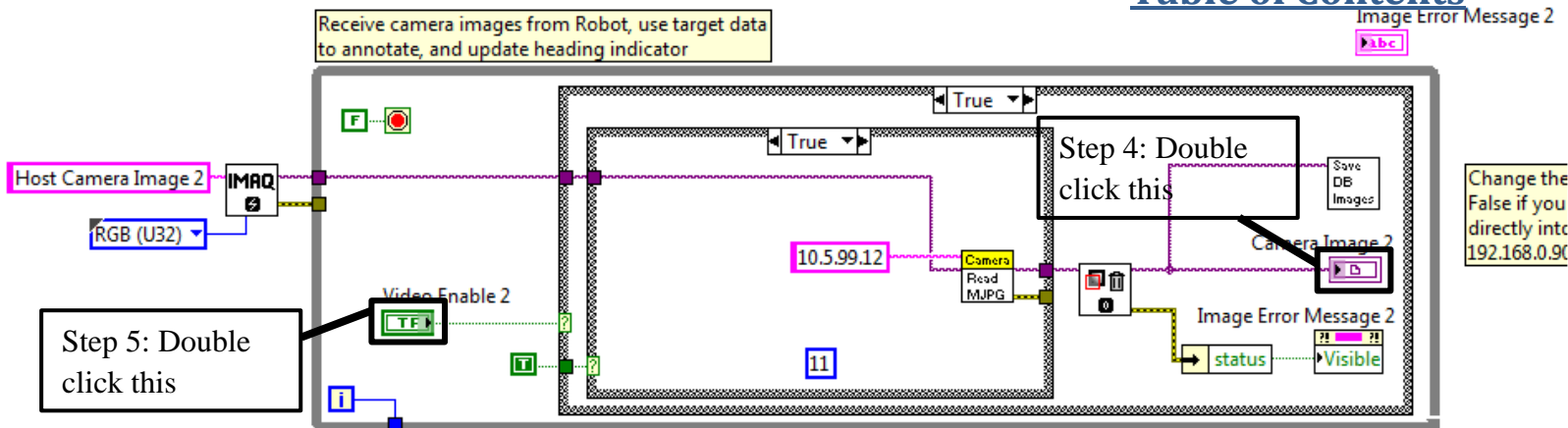
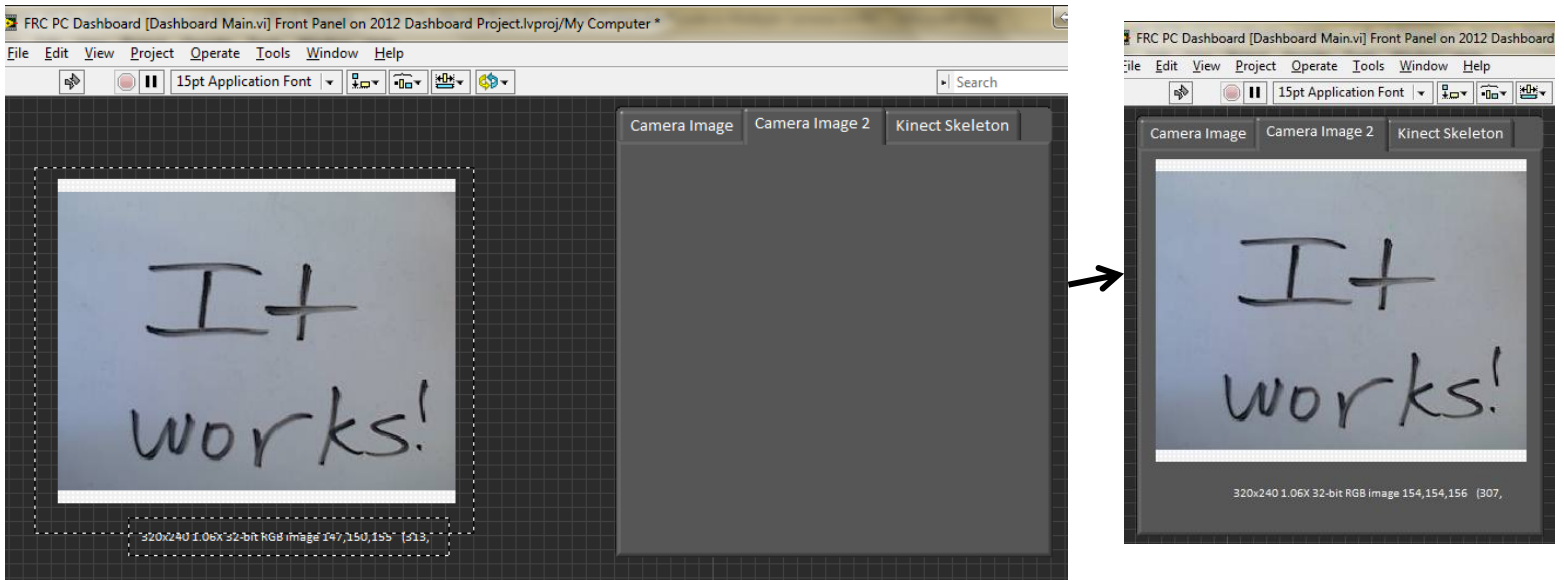


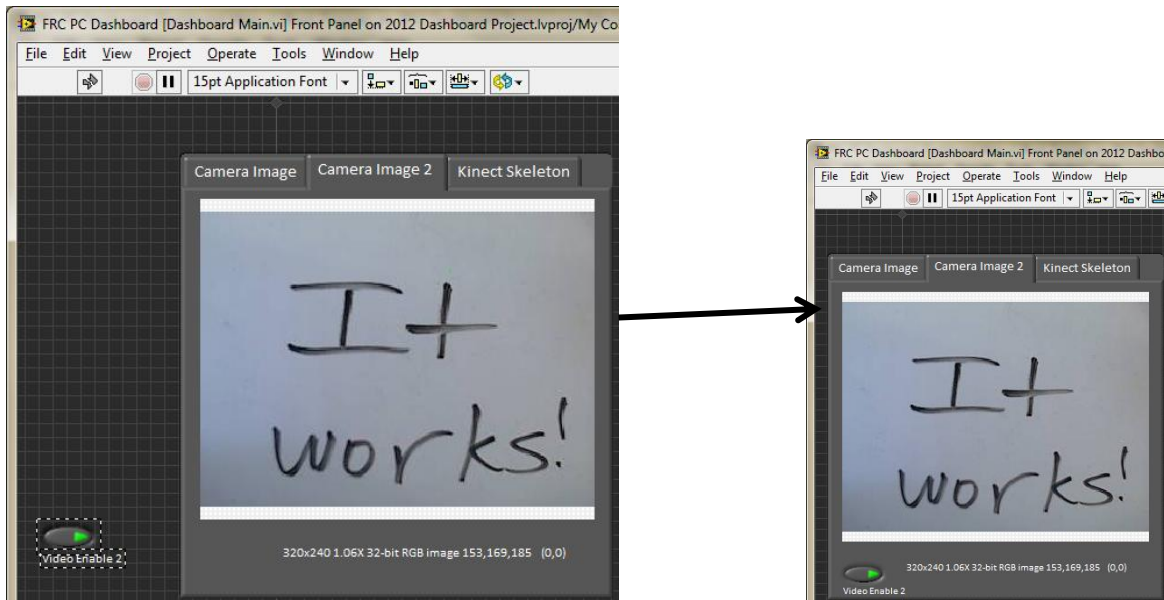
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- Now double click on "Camera Image 2". This should open a video in the front panel. Move the video to the second tab on the dashboard.



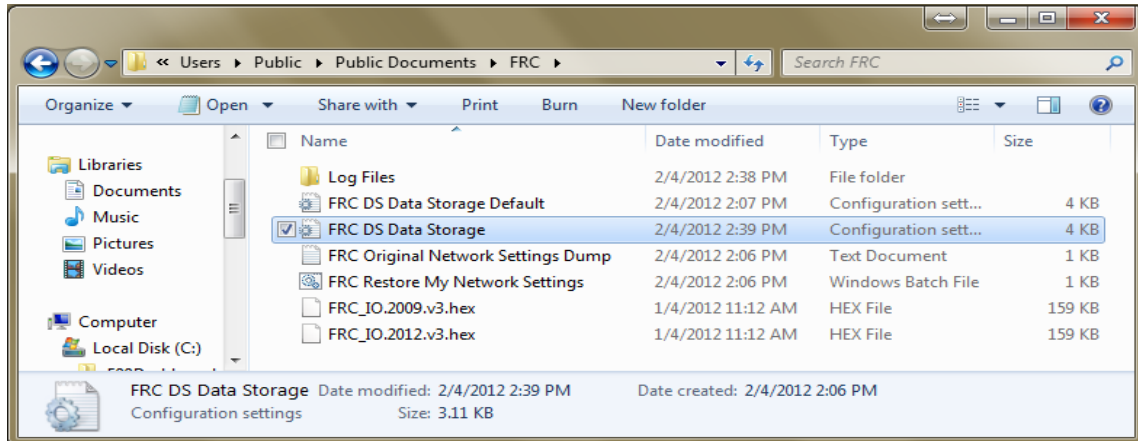
- Now double click on the “Video Enable 2” and now a video enable switch should pop up on the front panel. Move this to the second tab as well.



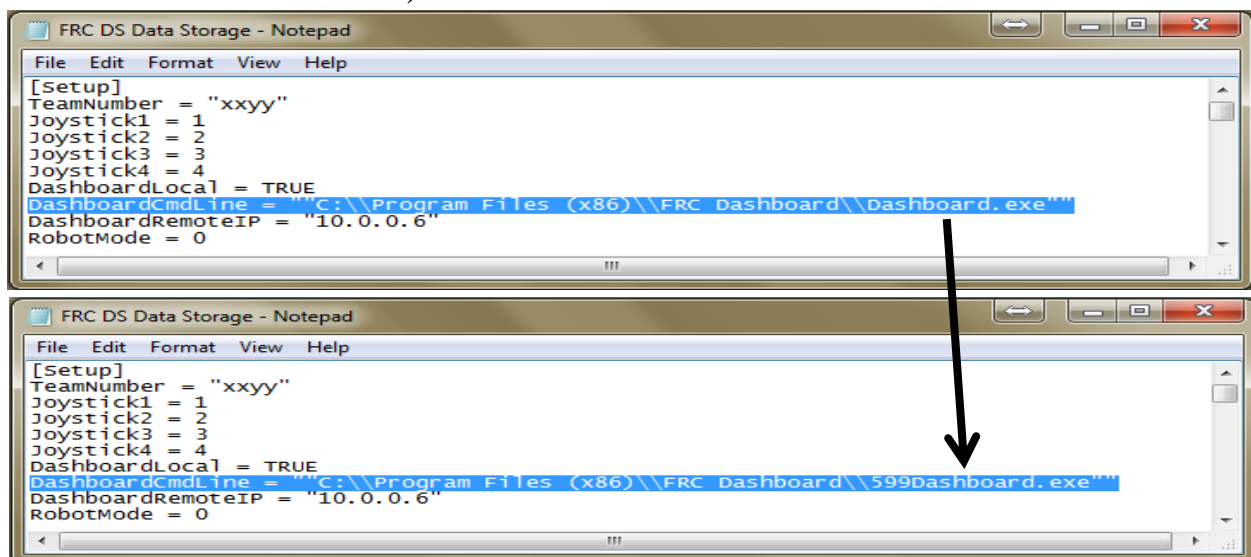
- Now you have to video feeds on your dashboard. Go to “File” and save what you have. Make sure you build the application as shown in Section 1, Step 6.

Section 4: Using Custom Dashboard in the Driver Station

1. To tell the driver station to use your dashboard, go to *C:\Users\Public\Public Documents\FRC* and double click on *FRC DS Data Storage.ini*. (if using Windows XP go to *C:\Documents and Settings\All Users\Shared Documents*)



2. Go to the line that says: *DashboardCmdLine=""C:\\Program Files\\FRC Dashboard\\Dashboard.exe""* and replace *Dashboard.exe* with the name of your application (ex. *599Dashboard.exe*). Then save and exit the file.



3. Now open the Driver Station and you should see you Dashboard with the two camera tabs.

Chapter 4

Calling Multiple Cameras in C++

1. Open your workspace in WindRiver. If using a SimpleTemplate then you can make it look like below. If you have a dedicated camera class then you can put the two lines of code above in there.

