FRC Team 1912 Combustion
2013 Controls System
Beta Testing Presentation

About Team 1912

- Northshore High School
- Slidell, Louisiana
- 2013 will be our 8th year
- Three time Regional Chairman Award Winners
- Four years of Beta Testing
- Website: www.team1912.com
- Email: combustion@team1912.com

About Beta Testing

- Used by FIRST as a way to test new controls equipment, both hardware and software before it is released to the public at kickoff
- Beta teams work with FIRST to find and fix bugs in code or documentation
- Teams apply and are chosen based on geographic location as well as strength in the fields of controls, communication and mentoring
- Teams work through a series of preassigned tasks and post their results to FIRST forge

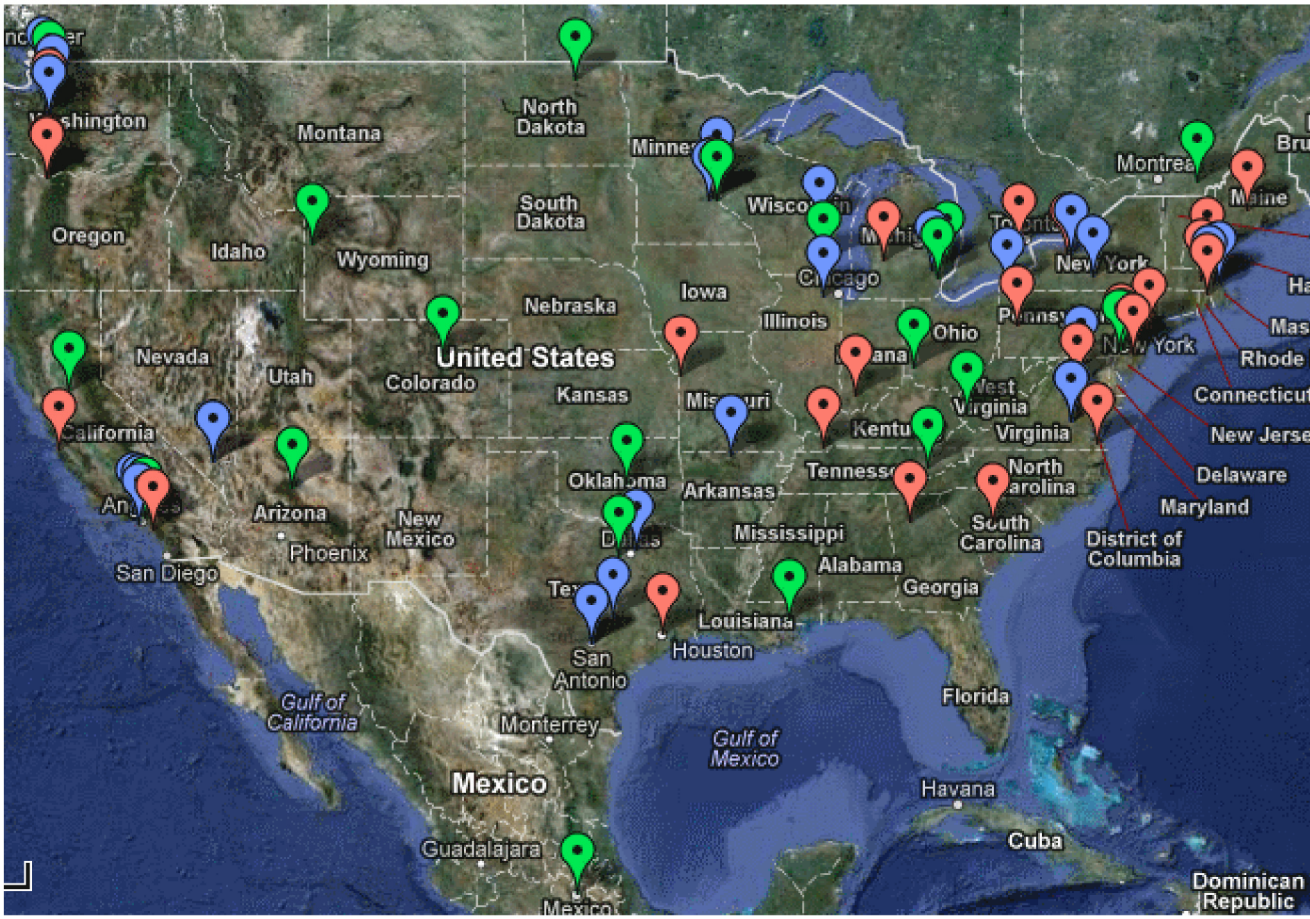
The Teams of Beta Testing

159 FRC Teams and 1 FTC team applied

Teams either used C/C++, Java or LabVIEW

25 teams per language

Team 1912 was selected to test LabVIEW and hardware.



*In addition, 1 in Hawaii and 2 in Turkey

1912 Beta Test Team

- Controls Mentor: Wendy Holladay
- Beta Test Lead: Rachel Holladay
- Beta Test Members: Ben Rowley, Daniel Yue, James Yang, Yuanxia Lee, Alex Lew
- Special Thanks: Sam Holladay
  (for chassis assistance)

LabVIEW Beta Tasks

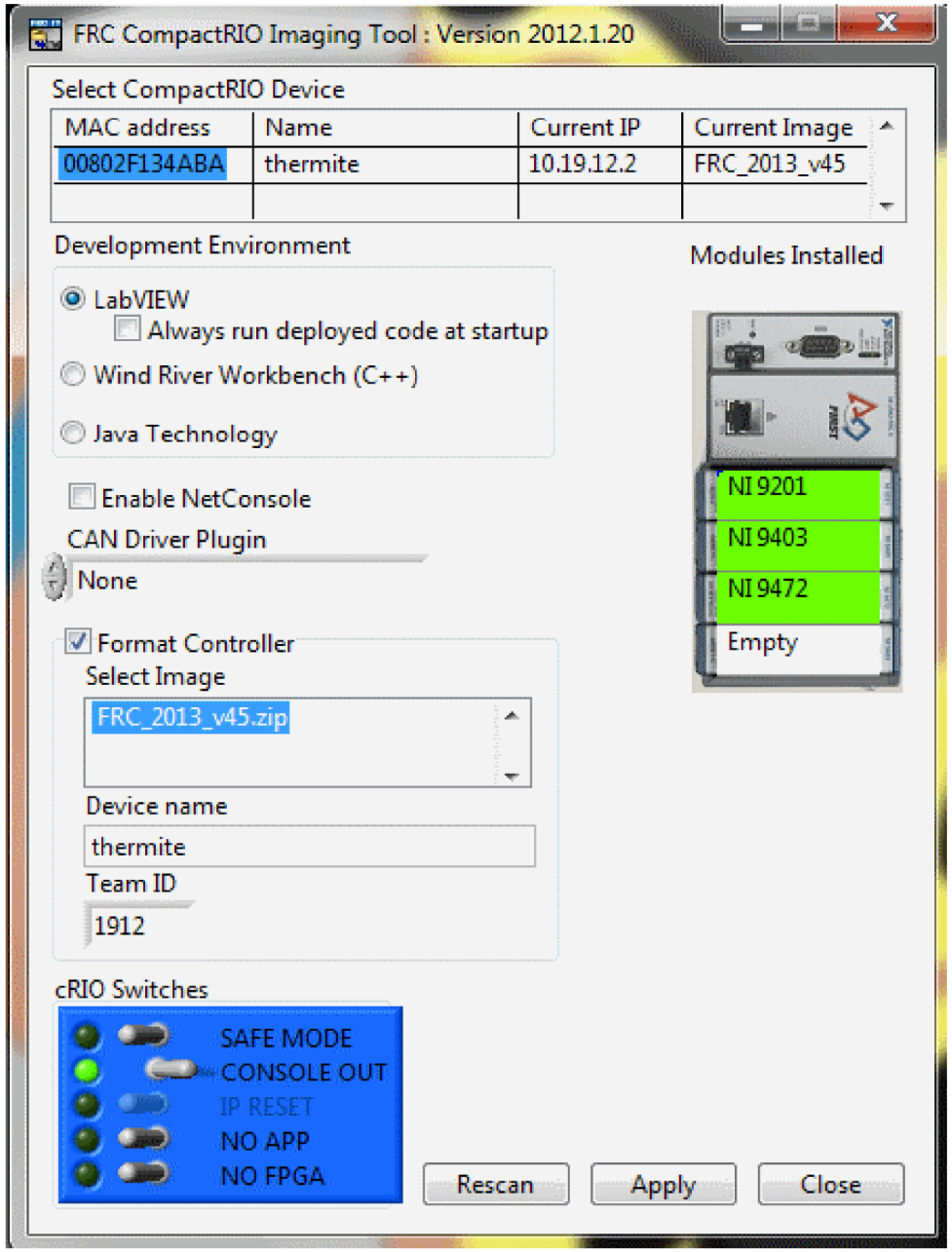
- Task 1 – Install and Update Software

  Task 2 – Software Development Tools Verification
- Task 3 – Port Last year‟s Code into Beta Language
- Task 4 – Develop unique programs in Beta Language
- Task 5 – Hardware Evaluation - for teams evaluating 2013 hardware only

Software Changes: Overview

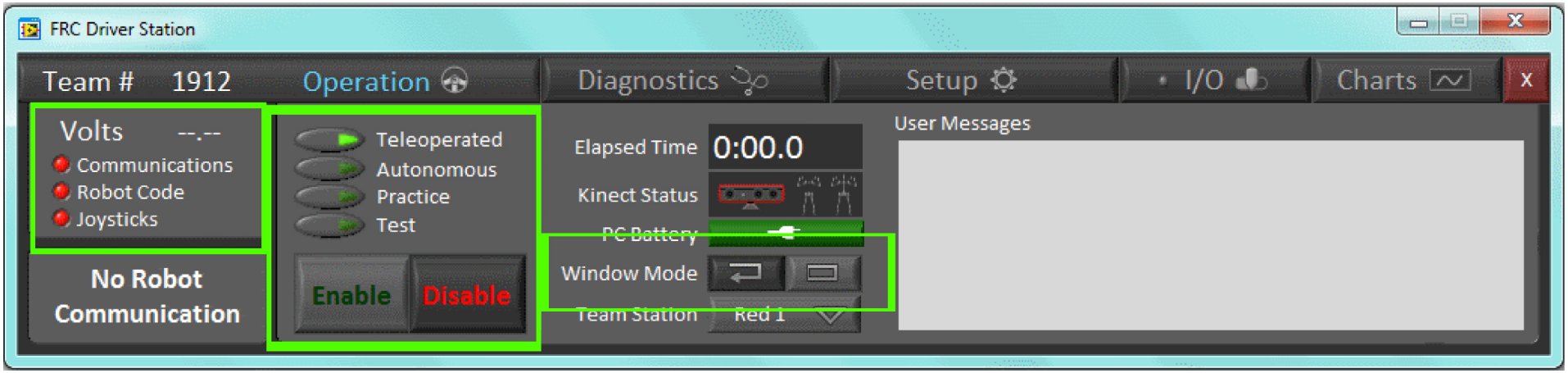
- New Image, v45
- Slight changes to Driver Stations
- Various tweaks to LabVIEW framework
- Addition of the 'Test.vi'
- Smart Dashboard and Dashboard Palette
- Robot Simulator

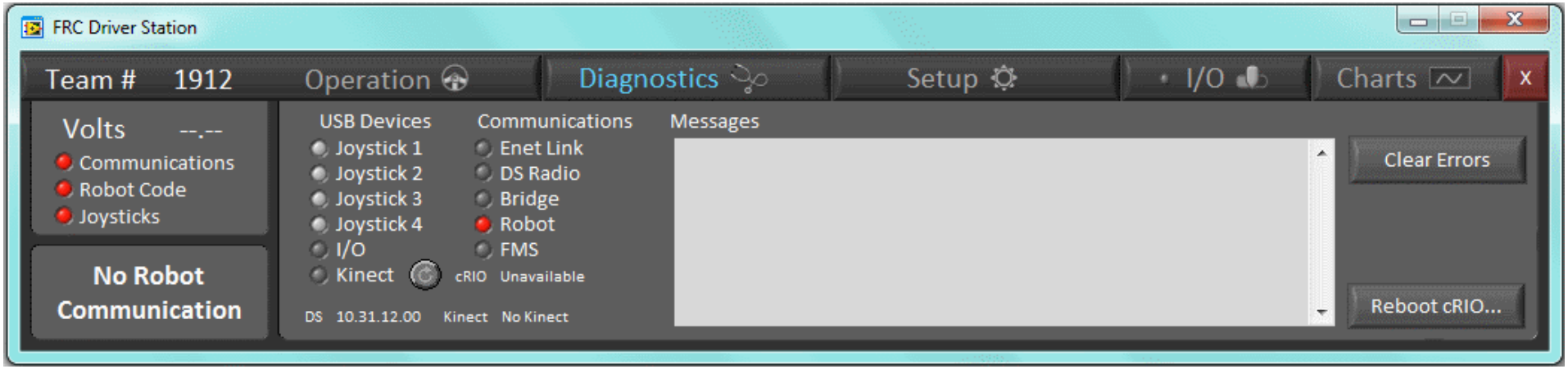
Re-Imaging Tool



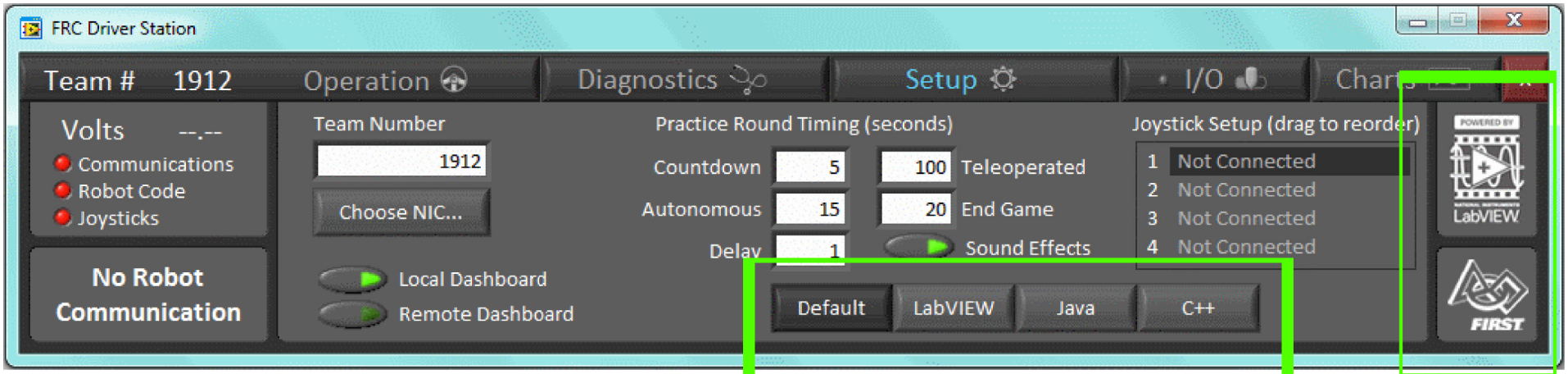
- The Re-Imaging tool had no significant changes from last year.

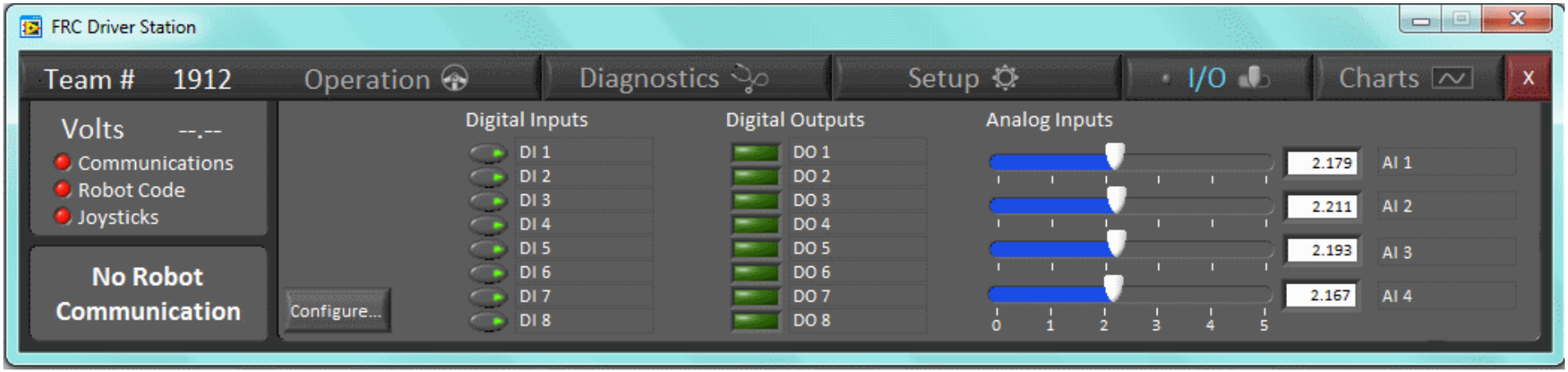
Driver Station Changes: Operation and Diagnostics



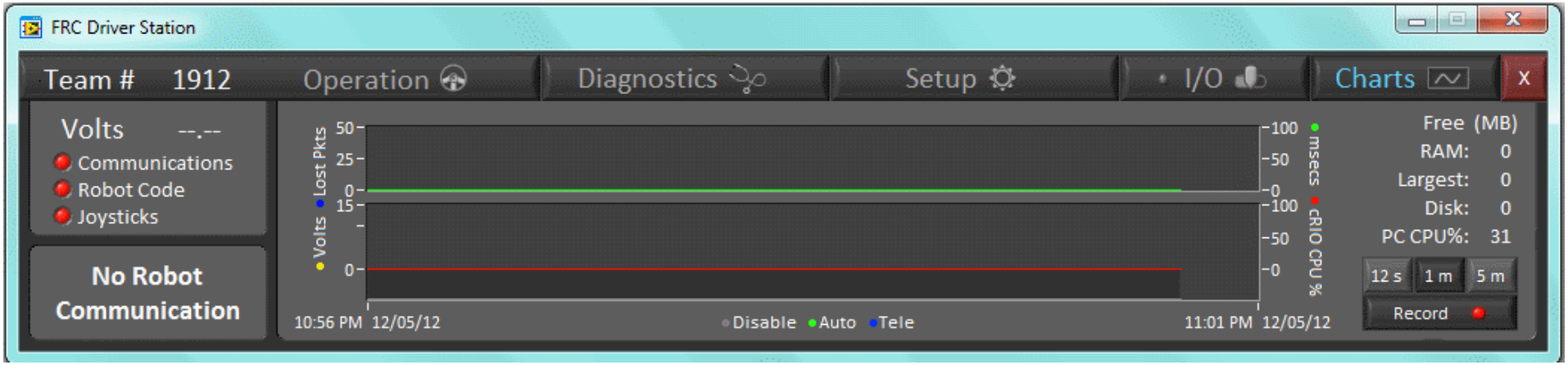


Driver Station Changes: Setup and I/O



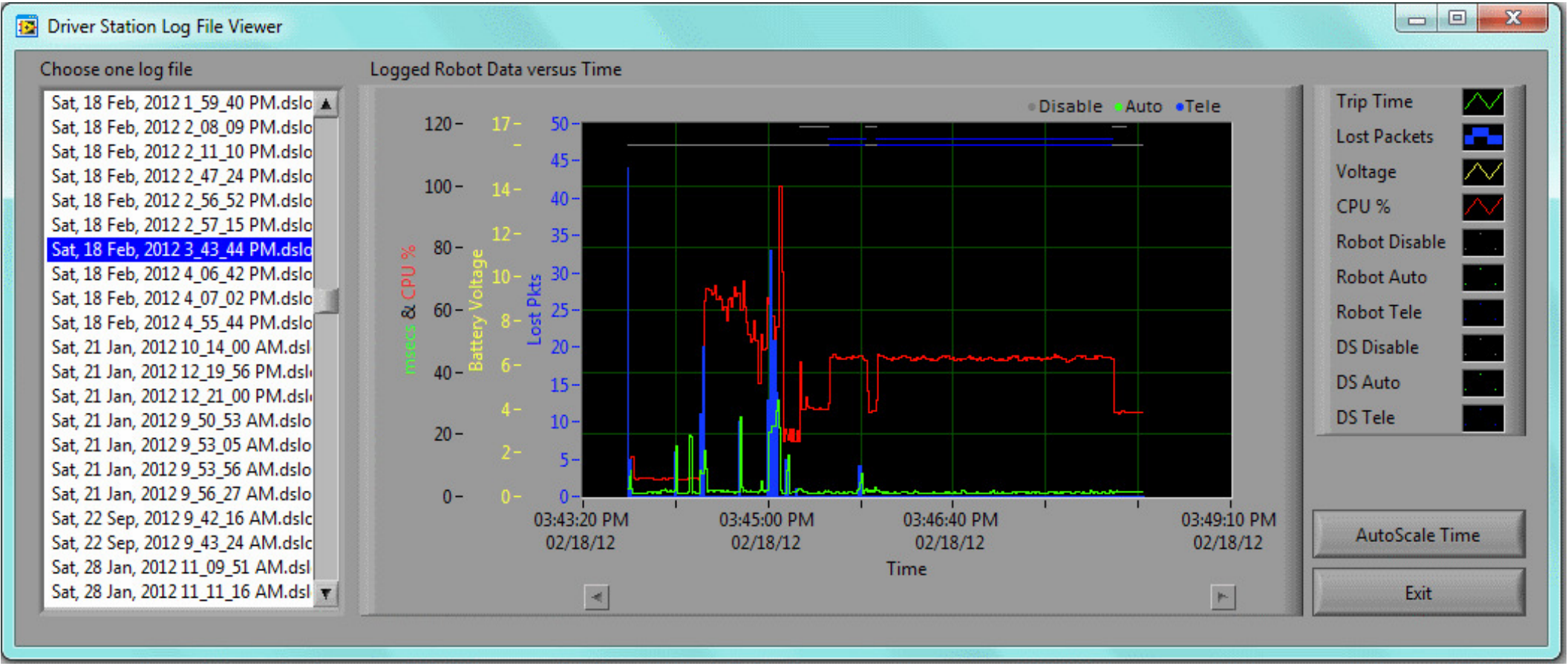


Driver Station Changes: Charts

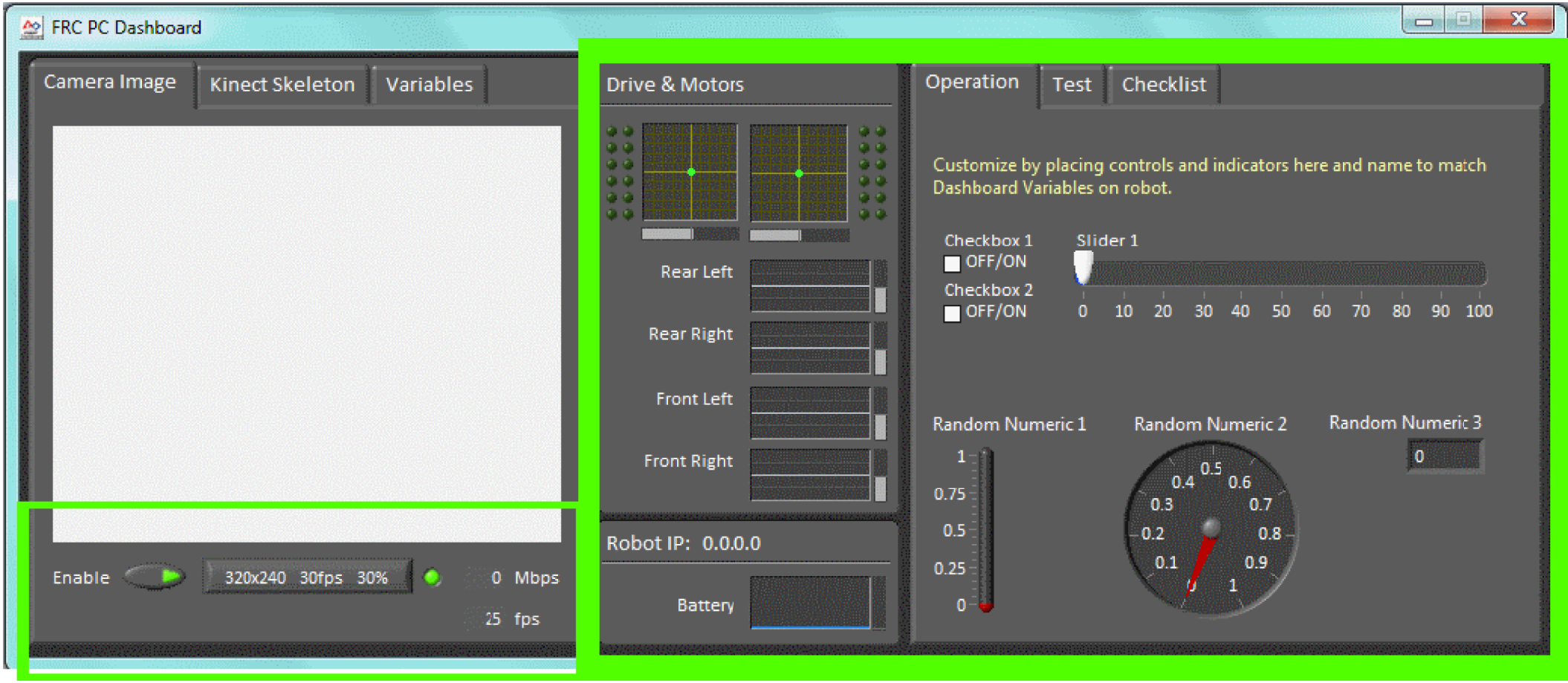


- But now the Charts tab is not the only way to view Robot Communication data. The new Data Log Viewer gives an easy way to analyze data.

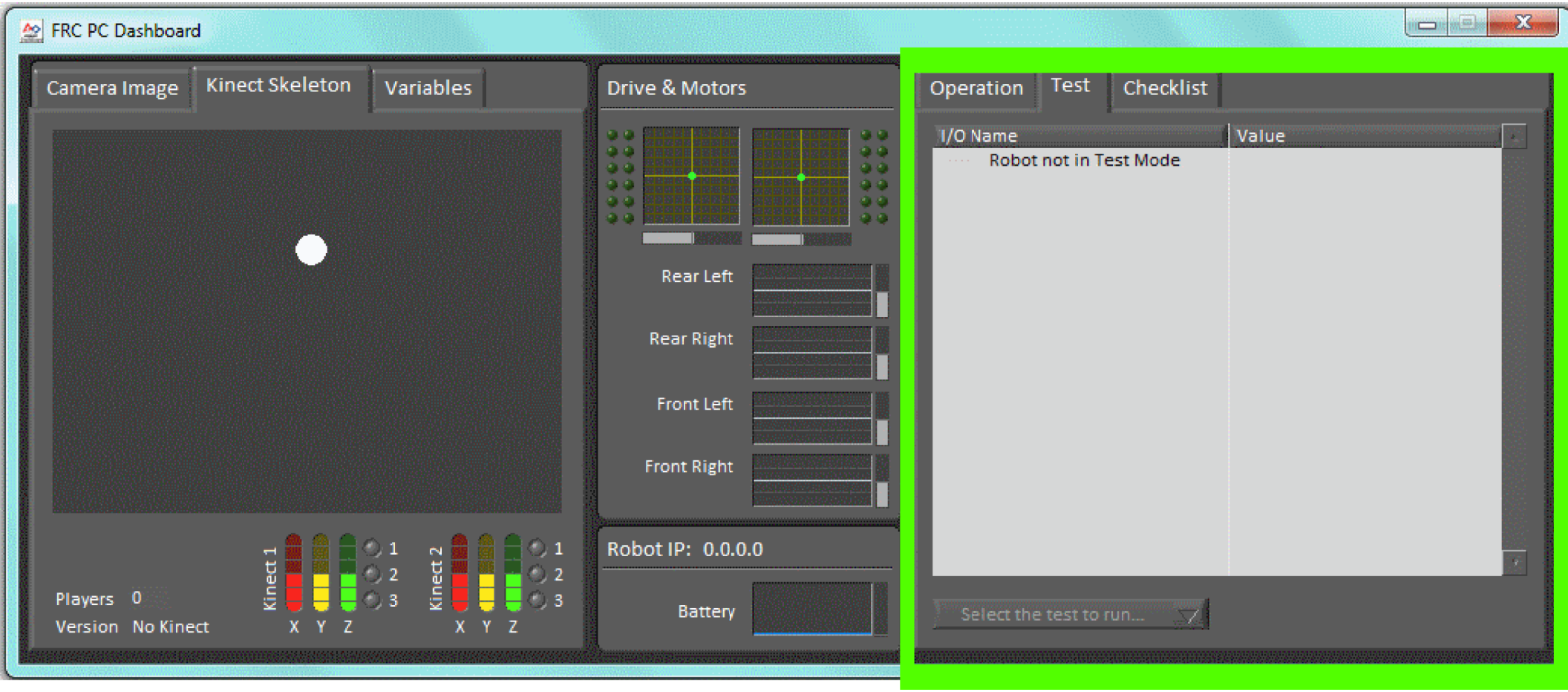
Driver Station Log Viewer



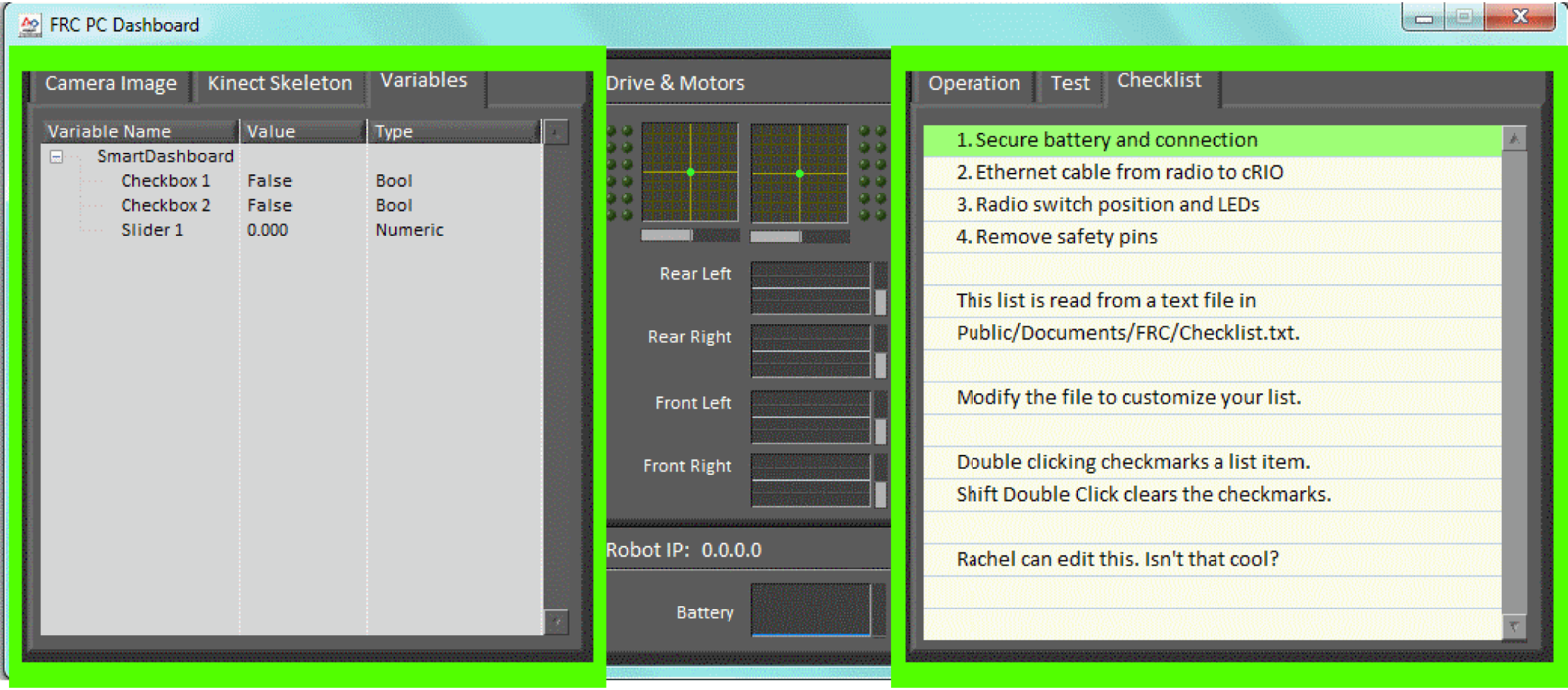
Dashboard Changes: Camera Image / Operation



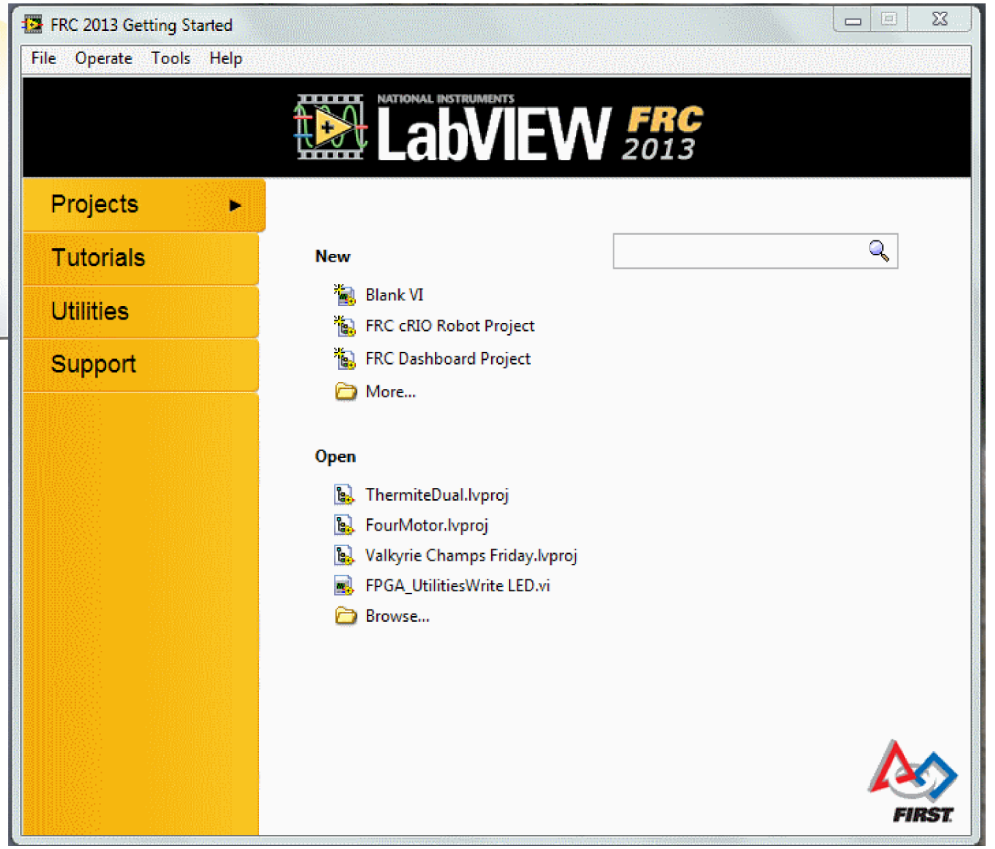
Dashboard Changes: Kinect Skeleton / Test



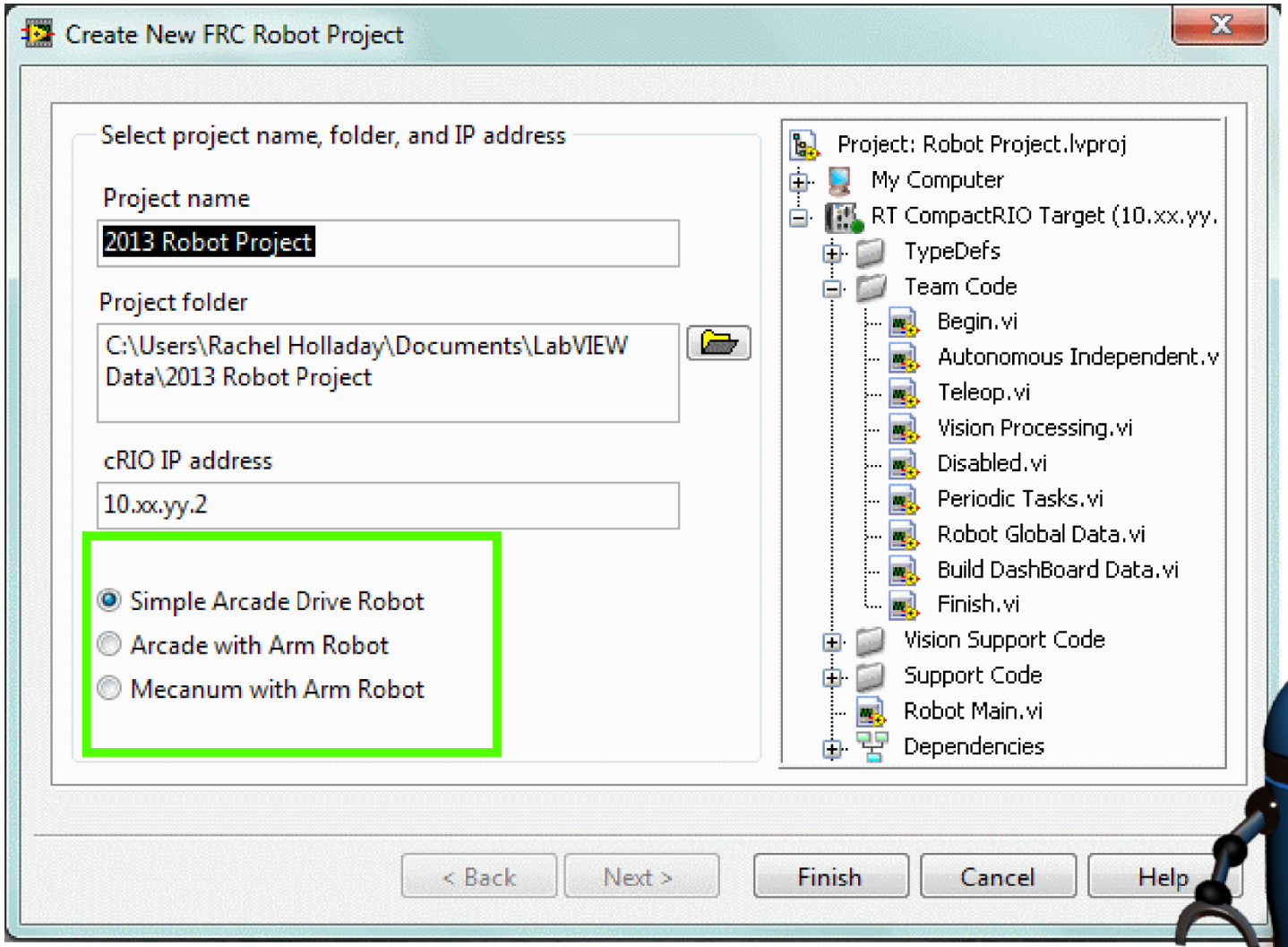
Dashboard Changes: Variables / Checklist



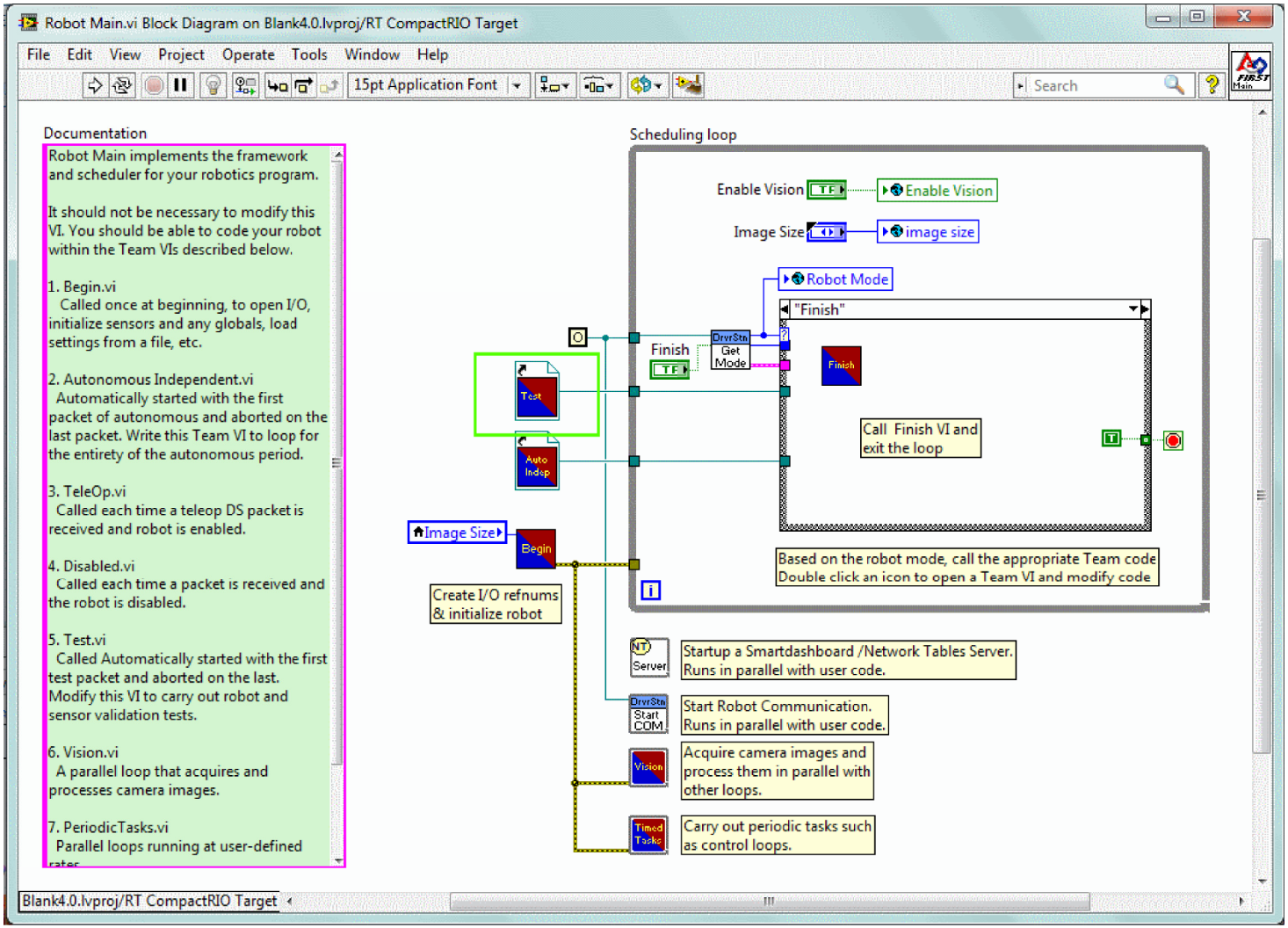
Framework Changes: LabVIEW Start-Up



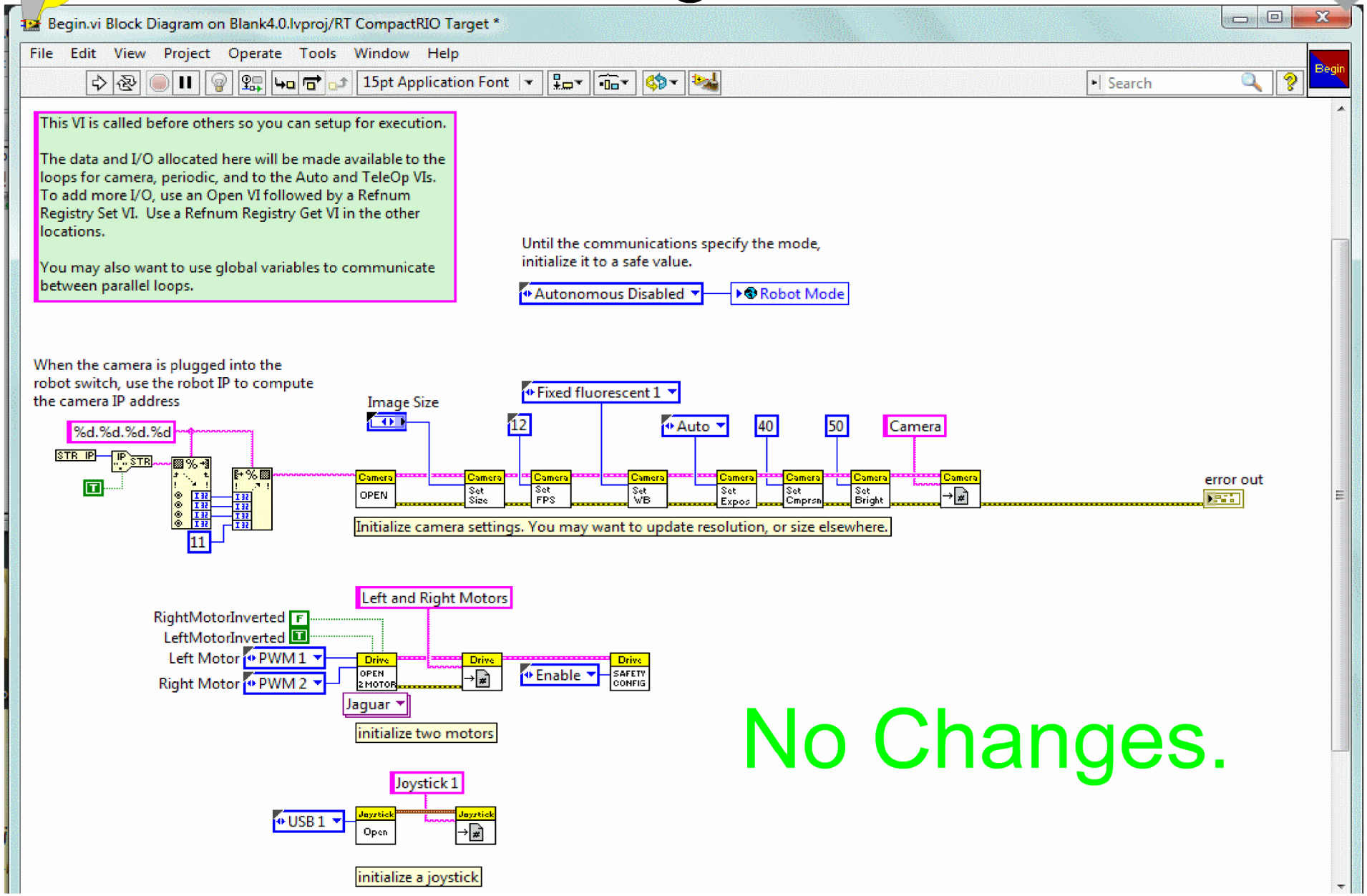
Framework Changes: Create a New Project



Framework Changes: Robot Main

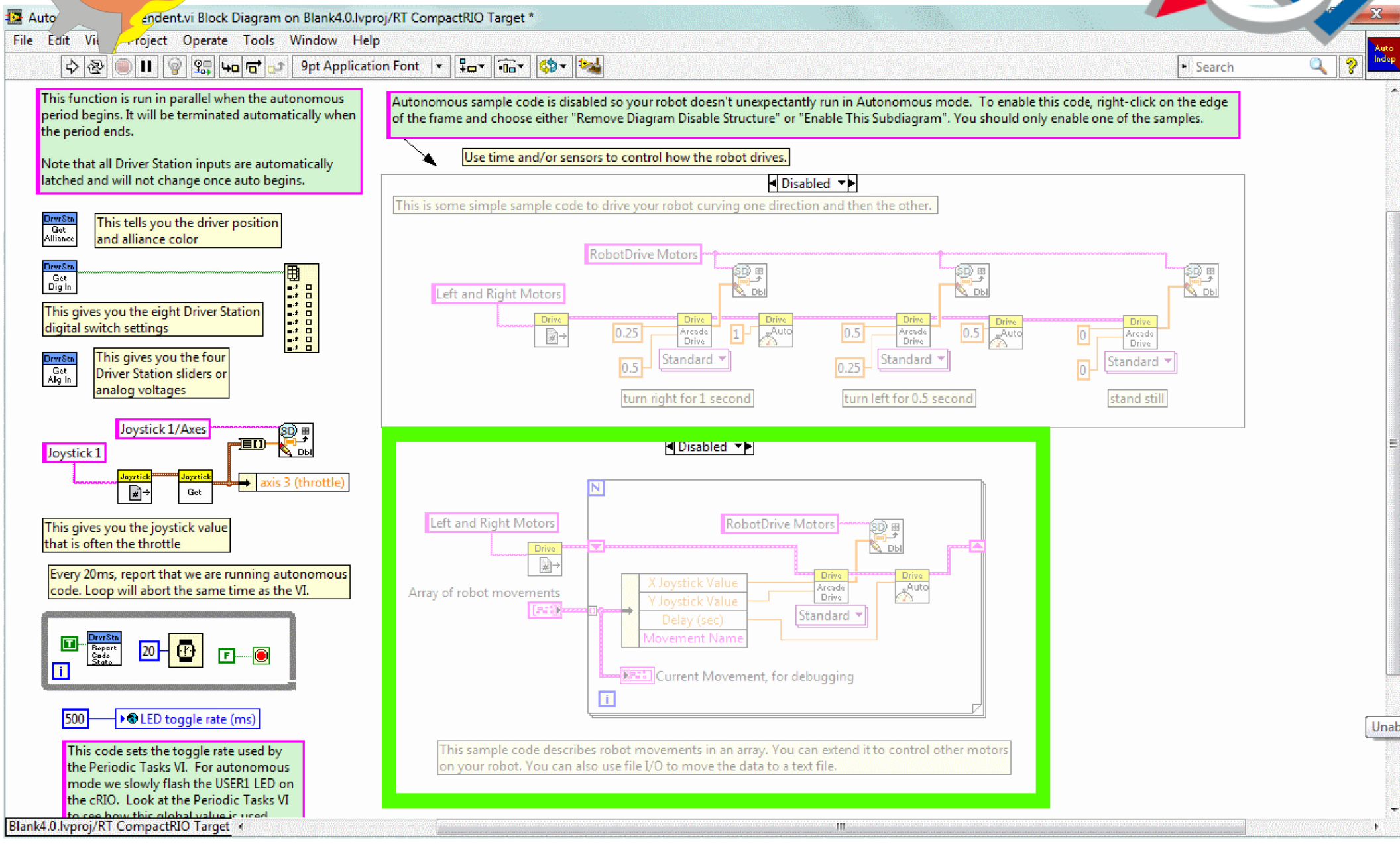


Framework Changes: Begin

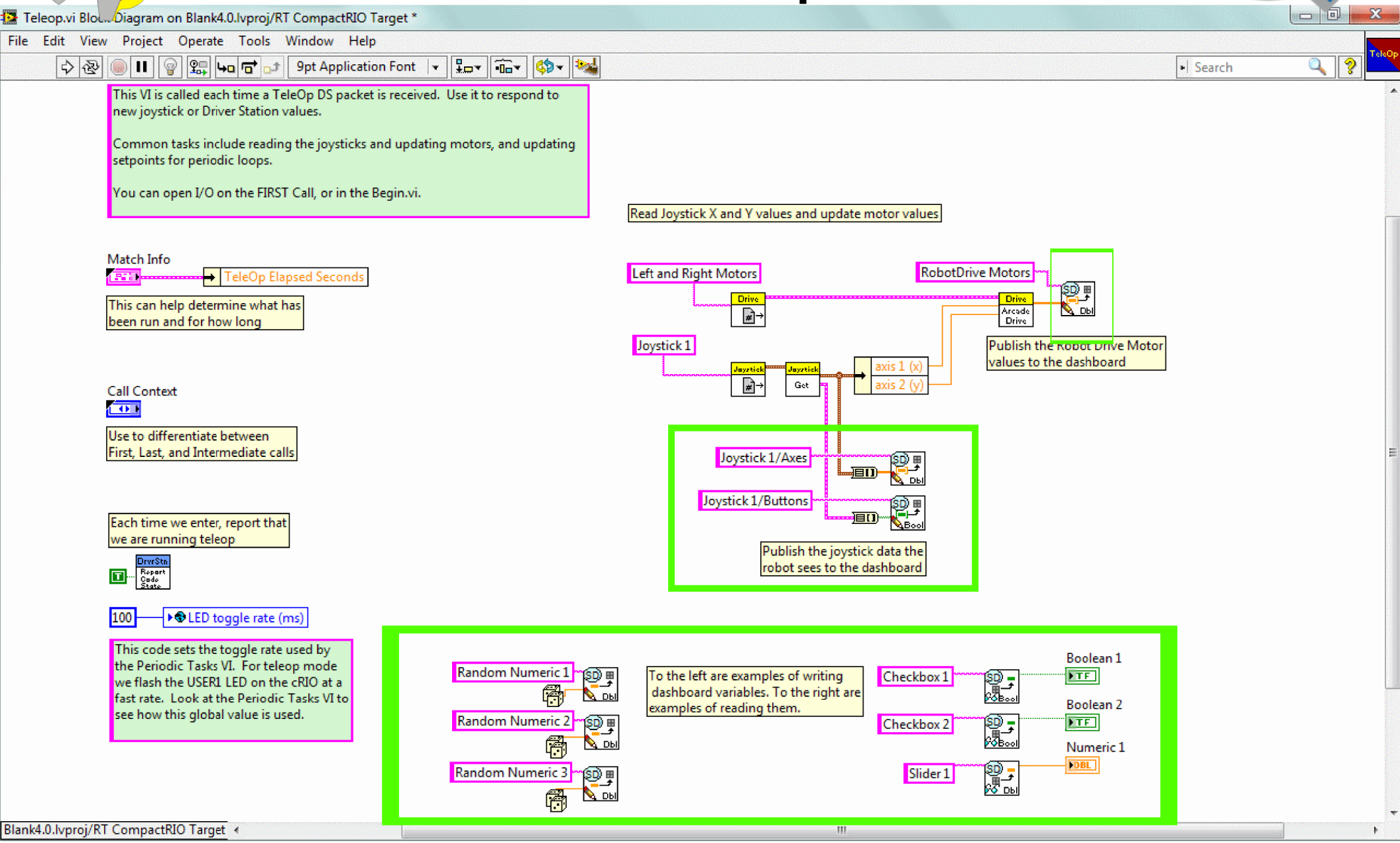


No Changes.

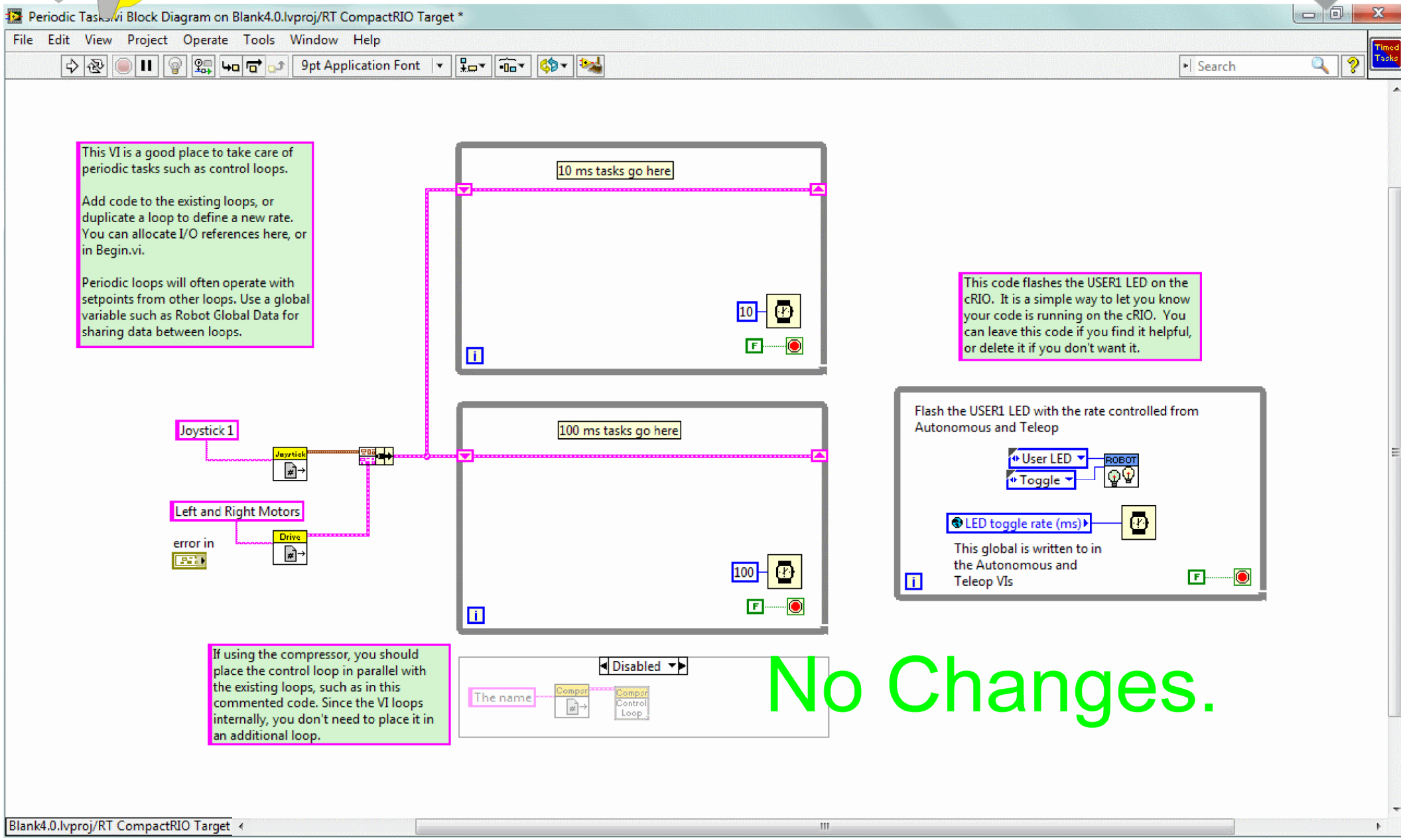
Framework Changes: Autonomous



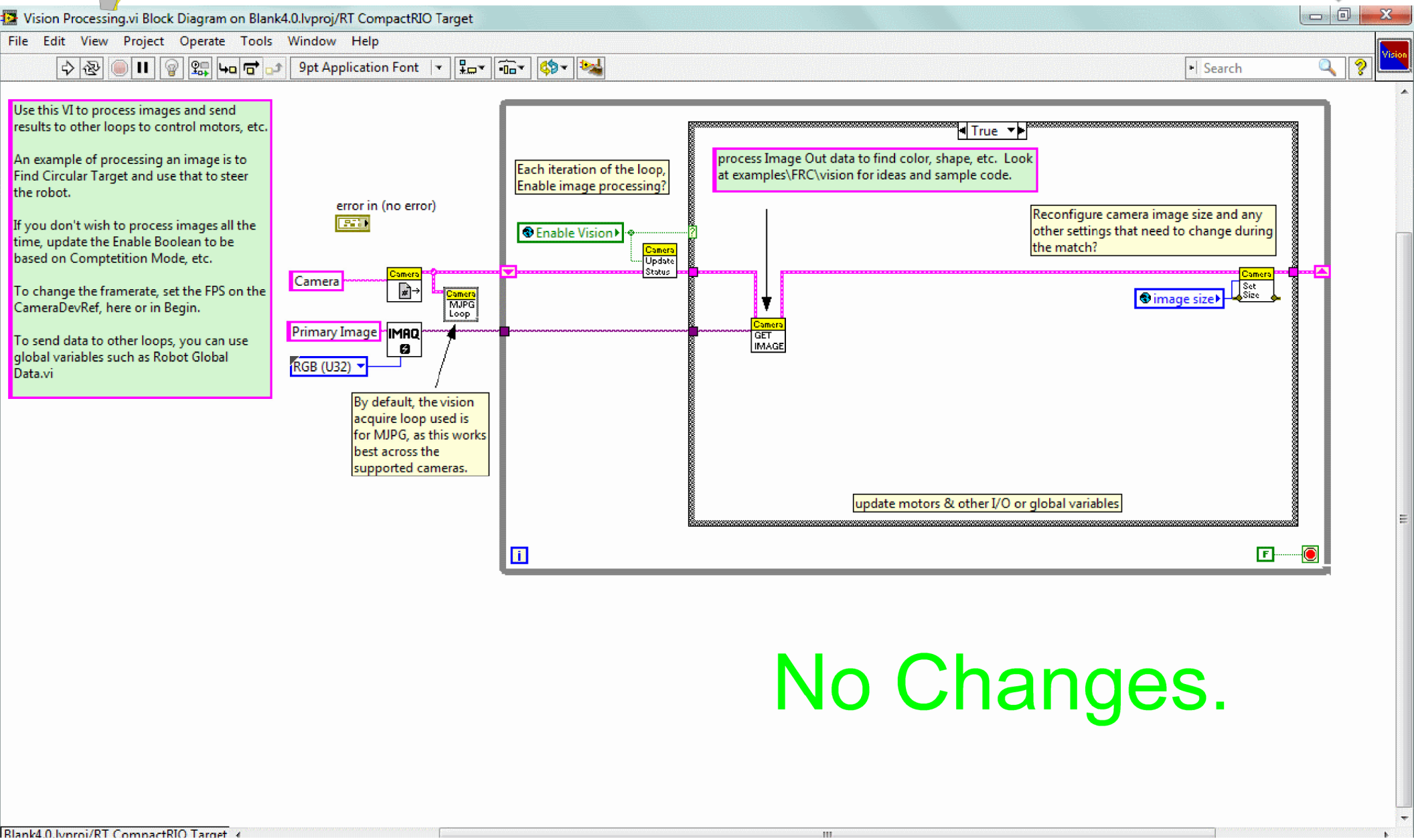
Framework Changes: Tele-Op



Framework Changes: Periodic Tasks

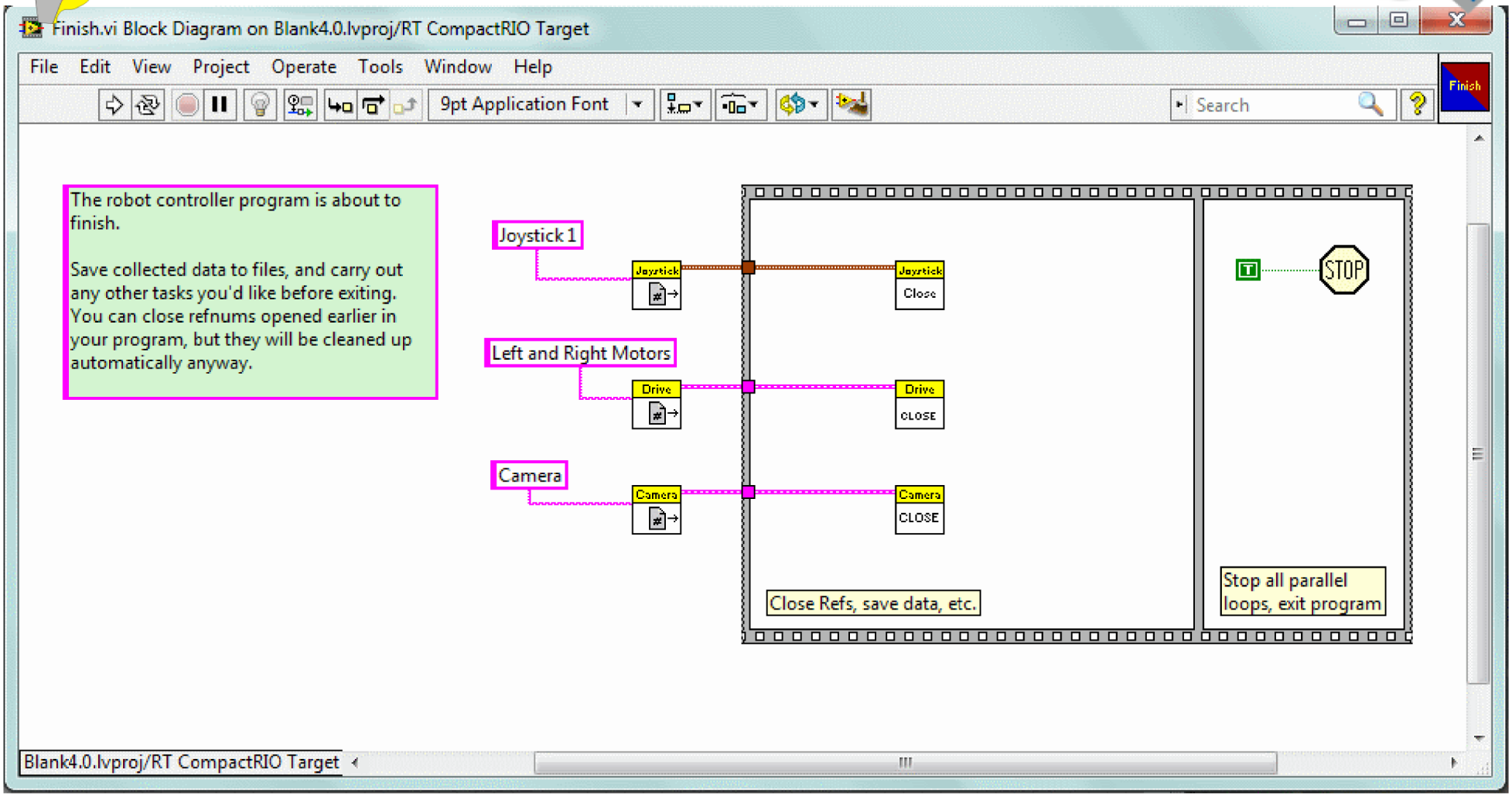


Framework Changes: Vision Processing



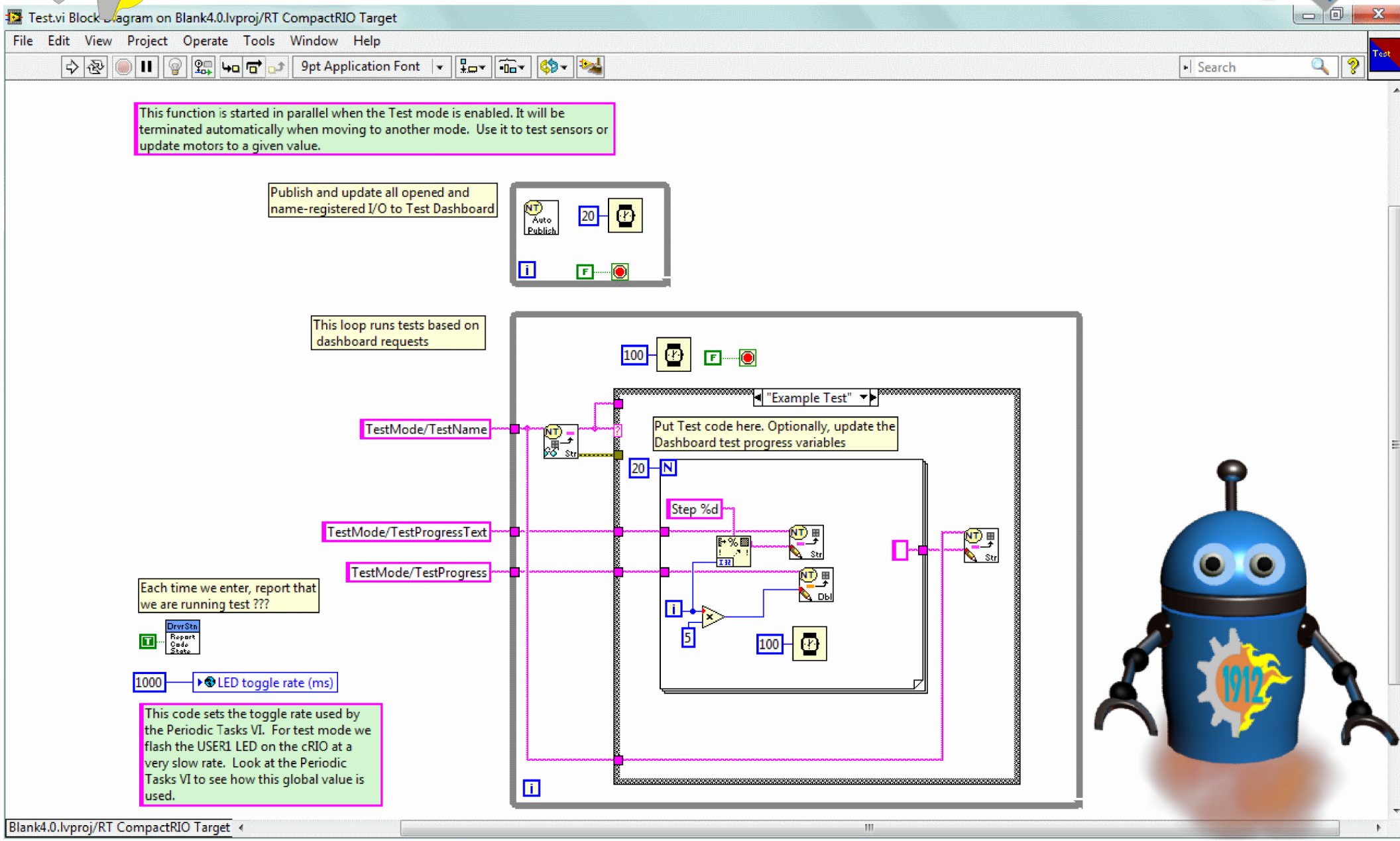
No Changes.

Framework Changes: Finish

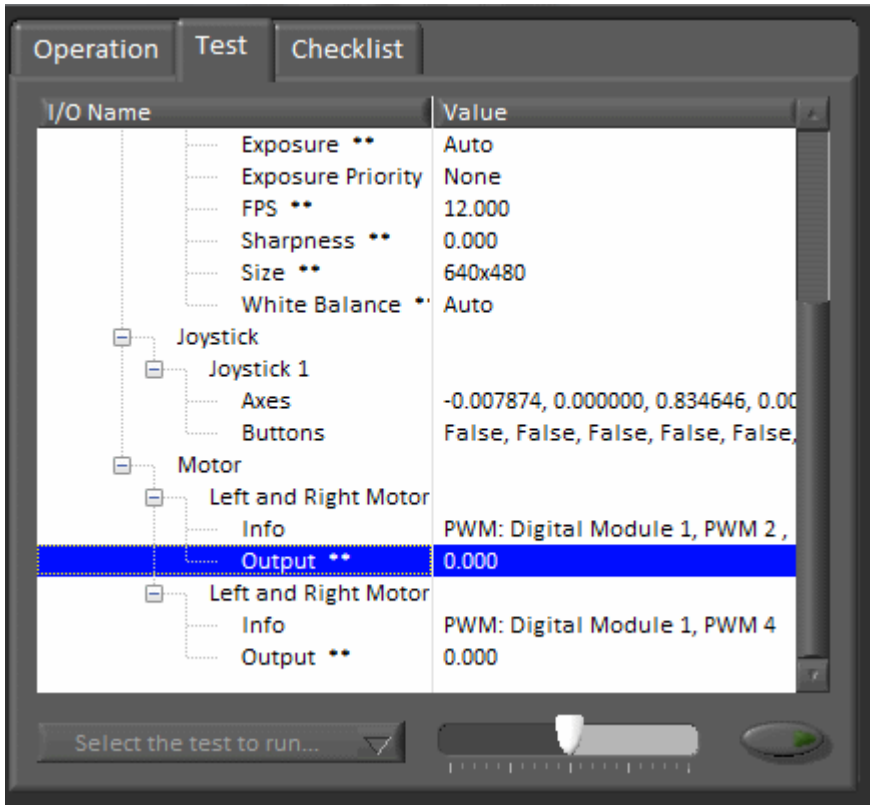


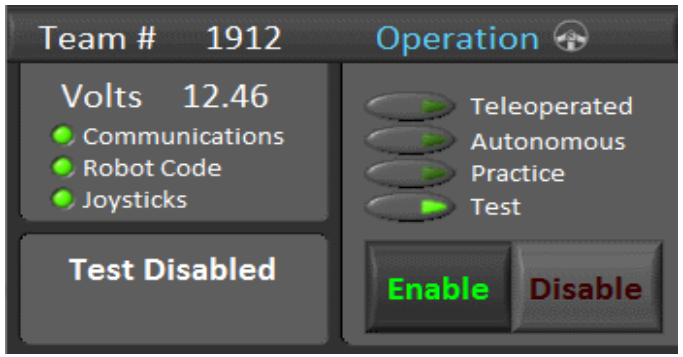
No Changes.

Framework Addition: Test.Vi



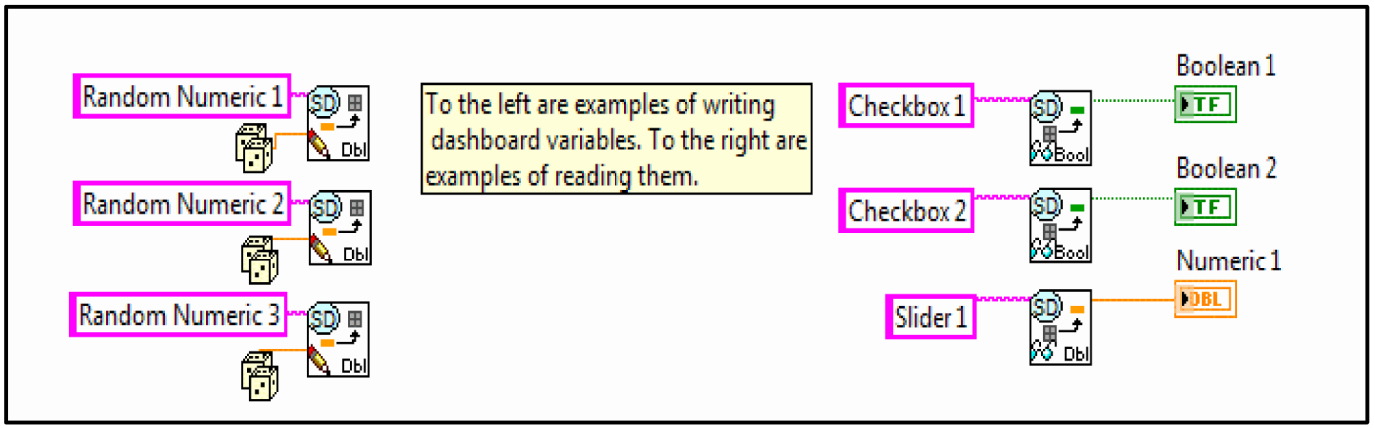
Purpose and Application of Test.vi

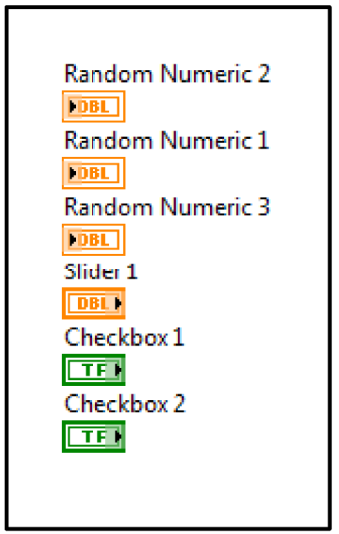




The new 'Test.vi' allows the coder to experiment by directly setting actuators (like motors) to certain values. You could also create little test snippets of code to run. Meant purely for debugging and can be in an enabled or disabled state.

Smart Dashboard





Inside Tele-Op values are fed into the Smart Dashboard, each with a unique name. The framework comes with some examples of how to read and write variables, as seen above. With read variables, the code includes an indicator on the Front Panel of the Tele-Op VI

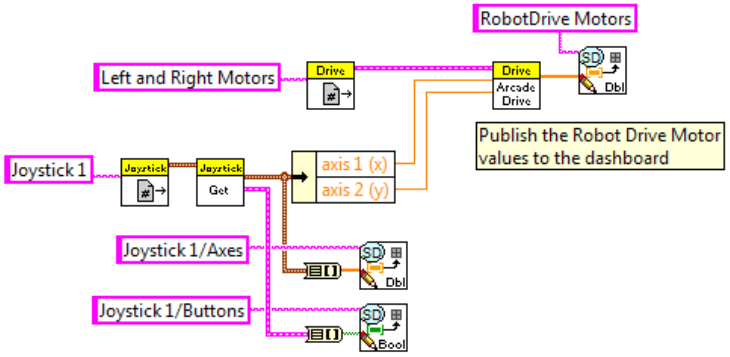
Inside the Dashboard code those unique names are used to make indicators or controls

Thermite Smart Dash: Robot Code

This VI is called each time a TeleOp DS packet is received. Use it to respond to new joystick or Driver Station values.

Common tasks include reading the joysticks and updating motors, and updating setpoints for periodic loops.

You can open I/O on the FIRST Call, or in the Begin.vi.



Match Info

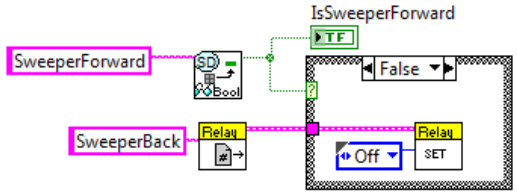
This can help determine what has been run and for how long

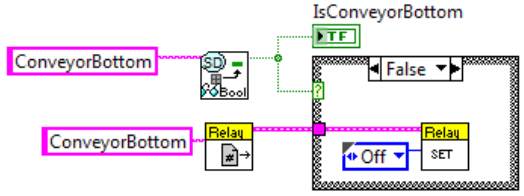
Call Context

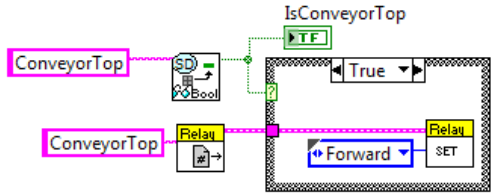
Use to differentiate between First, Last, and Intermediate calls

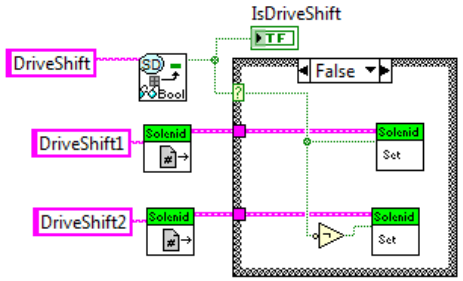
Each time we enter, report that we are running teleop

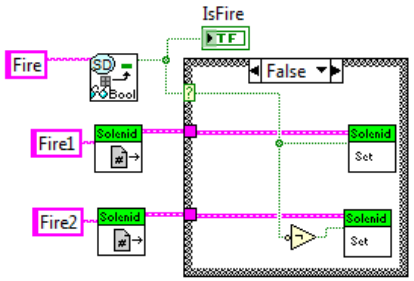
This code sets the toggle rate used by the Periodic Tasks VI. For teleop mode we flash the USER1 LED on the cRIO at a fast rate. Look at the Periodic Tasks VI to see how this global value is used.

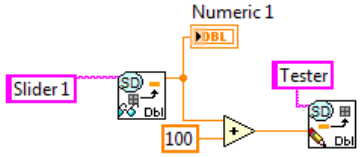




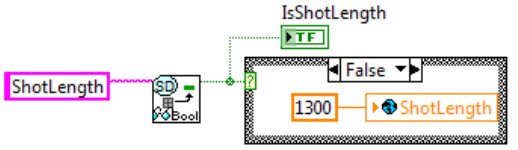




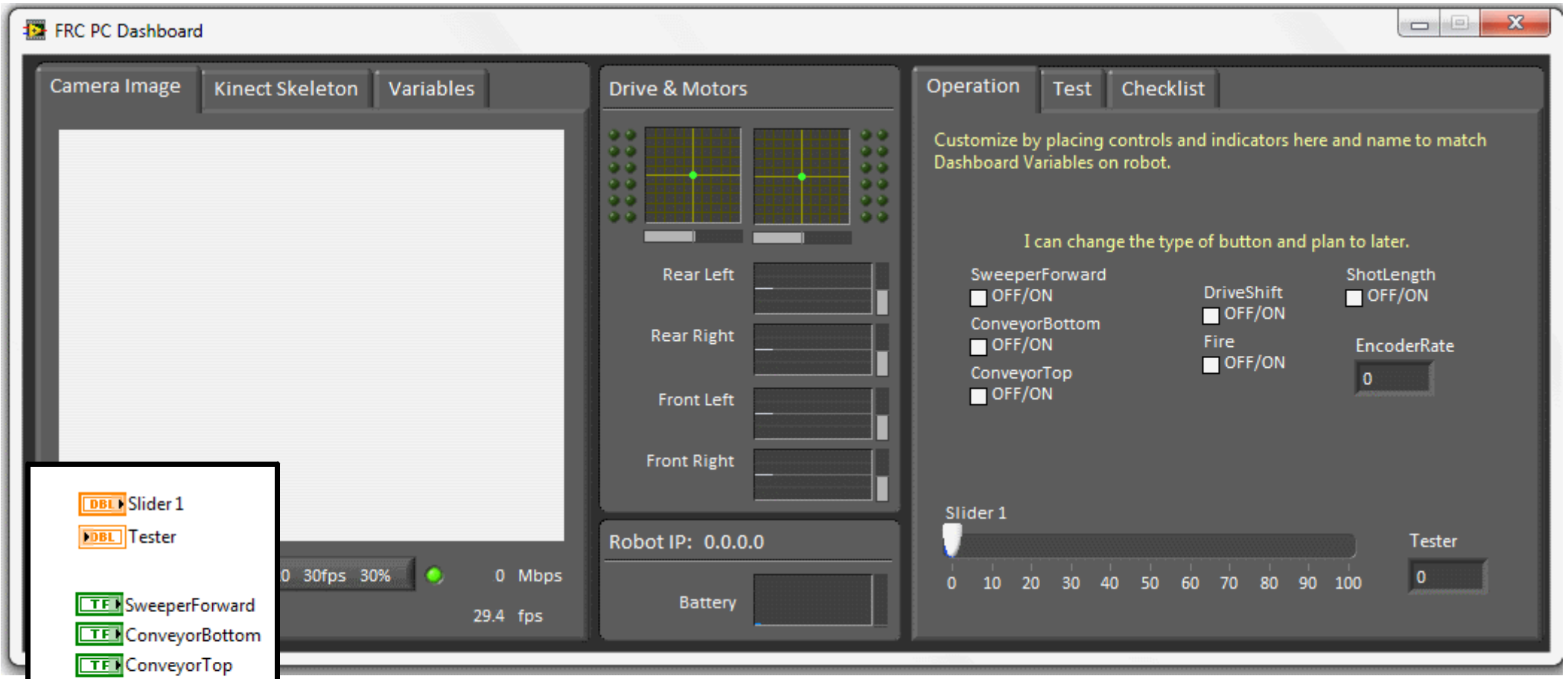




this was a test to see that i could add and indicator and have it update in real time.



Thermite Smart Dash: Dashboard Code



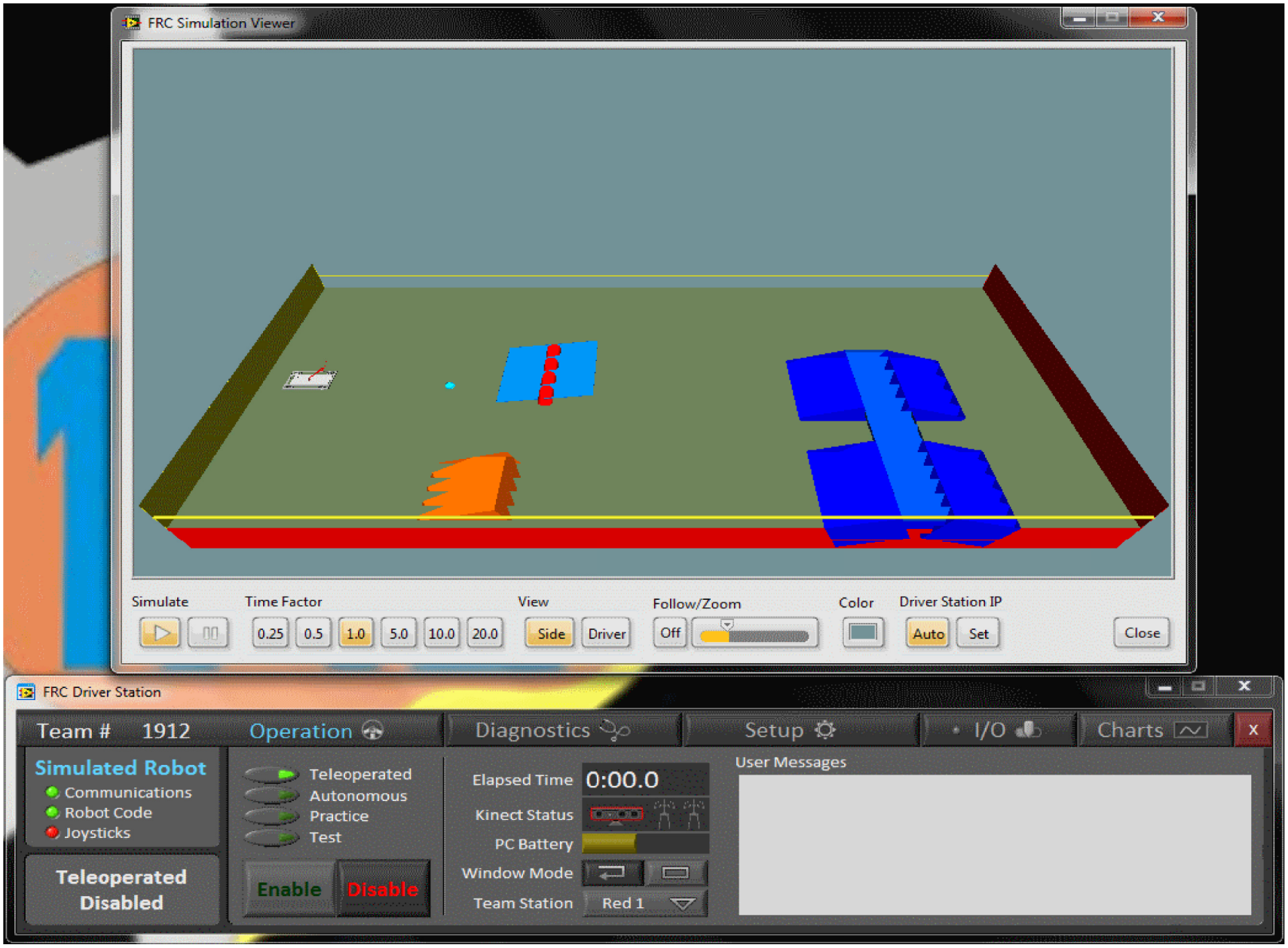
Simulator: Overview

- The simulator allows you to program a predefined robot without having an RT CompactRIO Target. Programming is the same except only the specific I/O of the predefined robot is supported.
- Robot code that works in simulation mode can be moved to the RT Target and run on a real robot.
- Interfaces and controls in a video game like matter where you control the robot

Simulator: Set-up

- To change from regular mode to simulator, simply change in Robot Main where the code runs (from RT cRIO to My Computer)
- The simulator is run with the Driver Station
- The code comes with a drive and then you can program in set actuators and sensors such as a claw servo, gripper servo, camera, encoder, gyro, etc.
- The outputs (such as the camera) read out to the dashboard like on the real robot

Simulator: Example Graphic



Simulator:
A Teaching Tool

- The simulator allows the coder to practice coding without a physical robot, therefore allowing the learner to concentrate exclusively on the programming. The range of actuators and sensors gives the programmer the opportunity to experiment with many different systems. The video game like setting is not only interesting and fun but also gives immediate feedback. Currently the Robot Simulator is only available for LabVIEW.

Kinect

- Last year for Beta Testing we conducted extensive Kinect testing. We renewed our testing of the Kinect this year as Kinect testing was a part of Beta Testing but not a separate sub-set. Aside from some exploration into how the Kinect views players, there was little testing to do. There was little sizable changes to the Kinect software and performance. The only notable difference was that we had to install this years Kinect software.

New Motor Controllers

- Legal Motor Controllers for this year: (As seen on the 3 October 2013 FRC Blog Entry)
  - Jaguars
  - Talons
  - Victor 888
- Rookies will get 1 Jaguar and 2 Victors in their kit and Veterans will get a PDV from IFI for 2 motor controllers of their choice
- We beta tested the new Victor 888

Victor 888

- Essentially it looks very similar to the Victor 884 and has a similar footprint
- Required a simple calibration
- In comparative qualitative testing the Victor 888 seems to respond a little faster than the Jaguar

Victor 888 Light Patterns

- When code is not running: Orange Blink
- When the controller is neutral: Orange Solid
- Partial forward or reverse: No Light
- Full Forward: Green Solid
- Full Reverse: Red Solid
- The follows the same pattern as Victor 884s and Jaguars with the exception of partial control

Questions?