Agenda

• 2015 control system show and tell
• Programming in Java/C++ for 2015
• Programming in LabVIEW for 2015
• Sensors and sensing
• git and source code control systems
• Look at other sources of information
2015 Control System Preview
roboRIO

- Dual-core ARM Cortex-A9 and FPGA
- Ethernet, USB, CAN, SPI, I2C, and serial
- PWM, servo, DIO, Analog I/O
Incorporating industry-standard LabVIEW RIO architecture from National Instruments, the NI roboRIO controller puts the same technology that professional engineers use in the hands of students. NI roboRIO is a robust, reconfigurable controller that, when paired with LabVIEW system design software, makes it possible for FIRST® teams to design complex robotics systems faster than ever. It features higher processor performance, a rich I/O set, a smaller footprint, lighter weight, and the ability to integrate with custom electronics. NI built this truly next-generation controller specifically with student robotics competitions in mind. Students will use NI roboRIO starting in the 2015 season of the FIRST® Robotics Competition (FRC®).
Power Distribution

- 12V thru circuit breakers
- Regulated supplies for RoboRIO, VRM and PCM
- CAN interface for logging current, temp, and battery
Pneumatics Control Module

- 12V or 24V pneumatics
- Compressor control
- CAN interface
Voltage Regulator Module

- Multiple regulated 12V and 5V outputs
- Power for D-Link radio, custom circuits, and IP cameras
Communications

- D-Link 1522 radio will be used for 2015
- mDNS used to identify roboRIO and other network pieces - works with Ethernet, WIFI, and USB
2015 Speed Controllers

Victor SP - replacement for Victors and Talon SR

Talon SRX - replacement for Jaguar with full CAN control
Typical Wiring Diagram
Software

- RoboRIO based on Linux
- Full suite of WPILib languages
  - C++
  - Java
  - LabVIEW
Linux

- Standard linux with real-time extensions
- You can use standard tools like ssh, valgrind, command shells, etc.
- Ability to easily port other tools
Tools

• Web interface for roboRIO
• Dashboards
• New imaging tool
• New Driver Station
• Robot Simulator
Driver Station

- Several new features for 2015
  - Enhanced joystick support
  - Split UI
  - mDNS support
Imaging Tool
New Text-based language IDE

- Both text-based languages use eclipse
- Unified interface for Java and C++
- Off the shelf stock version of eclipse with downloadable plugins
- Templates for project types
Simulation

- High fidelity simulation
- Gazebo robotics simulator
- WPILib C++ and Java
- Currently supplied with sample robots
- Future: add your own models