The 2015 FRC Robot Control System

N.E.R.D.S.

Buena High School Robotics

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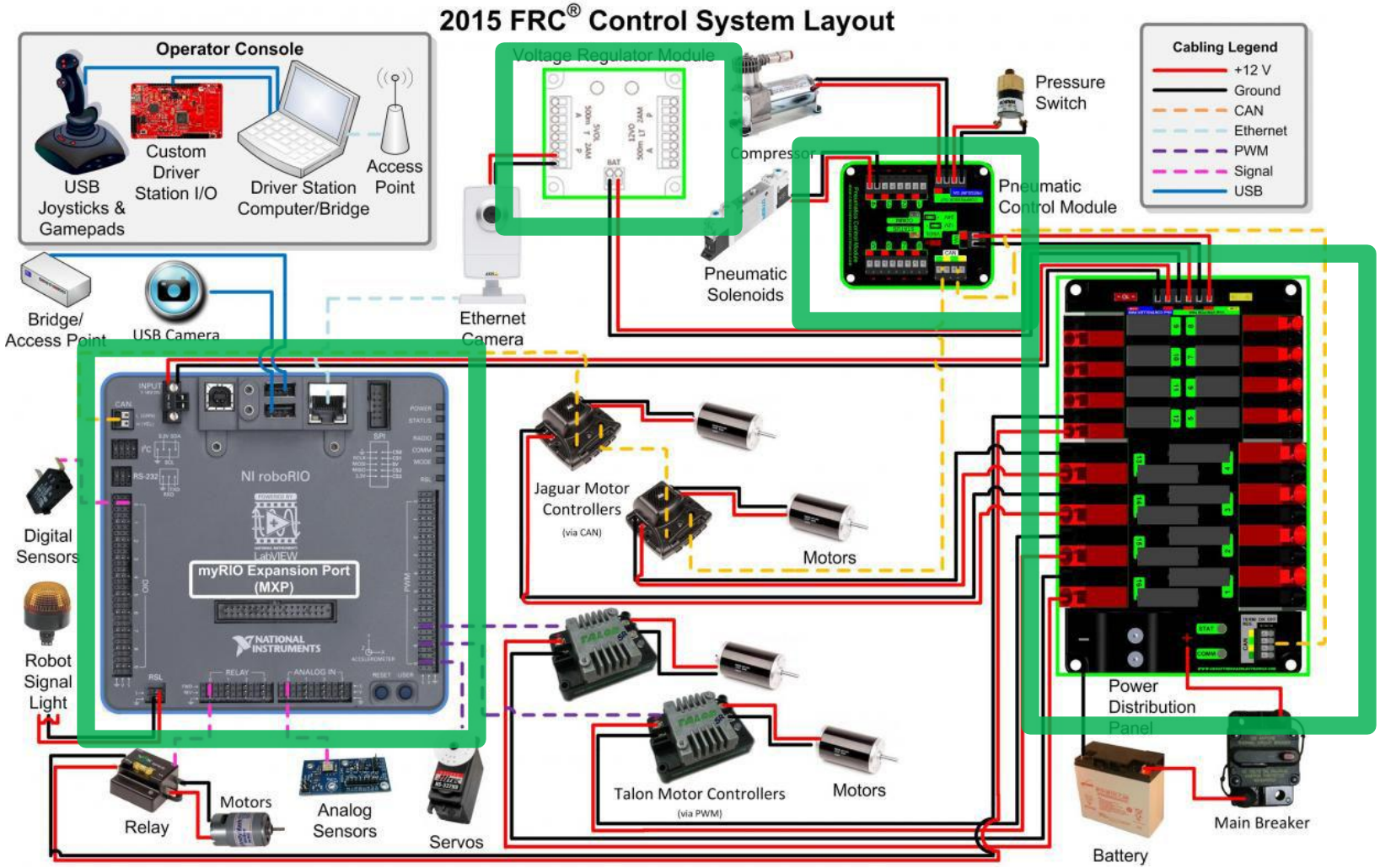
Programming/Electronics Mentor

Background

- FIRST has developed an updated control system for 2015
- Uses components from National Instruments & Cross the Road Electronics
- Currently undergoing beta testing by selected teams
- Adds new capabilities while updating existing features

Introducing the 2015 Control System

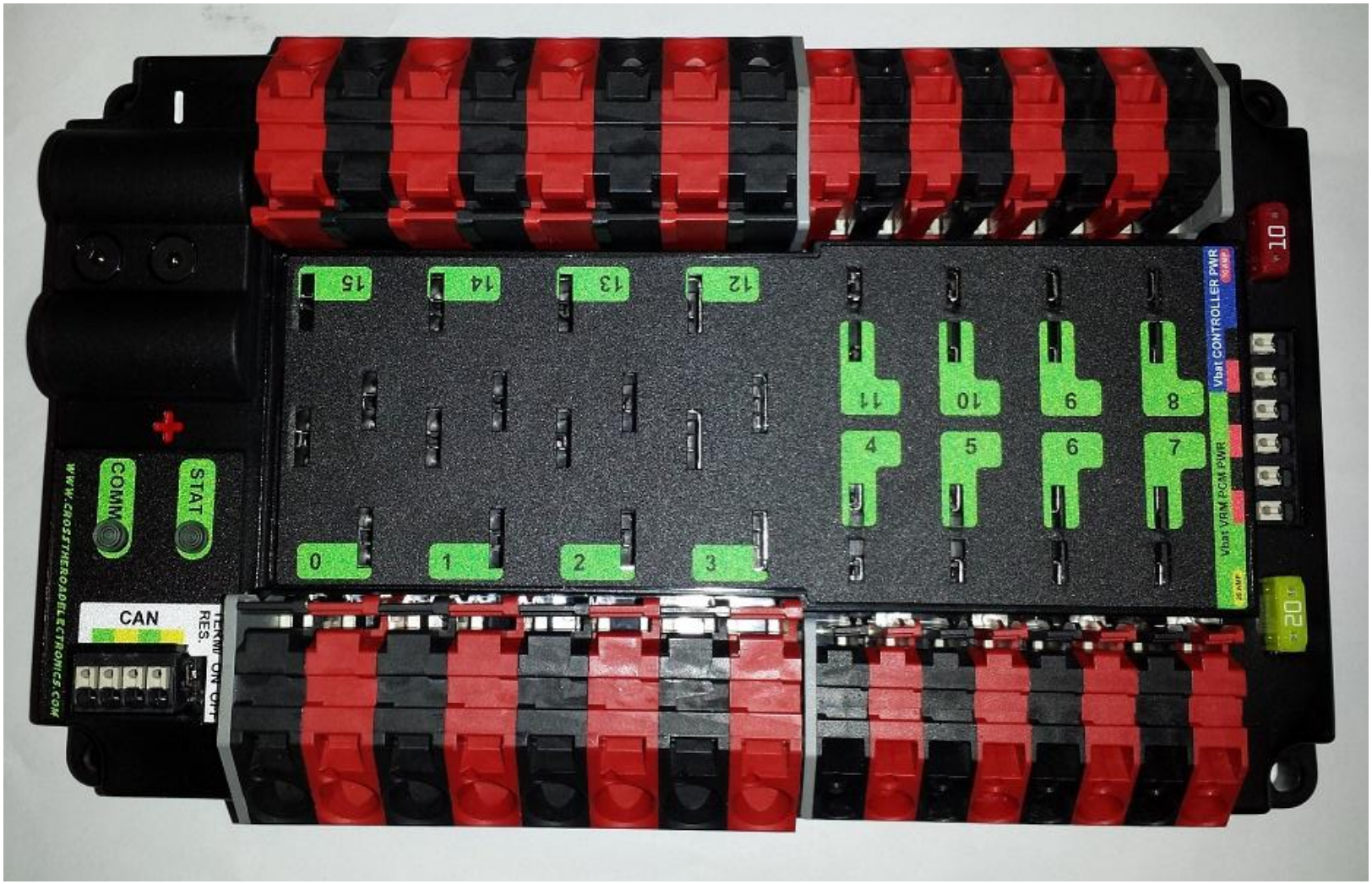


Thanks To Team 358 – Robotic Eagles

The RoboRIO

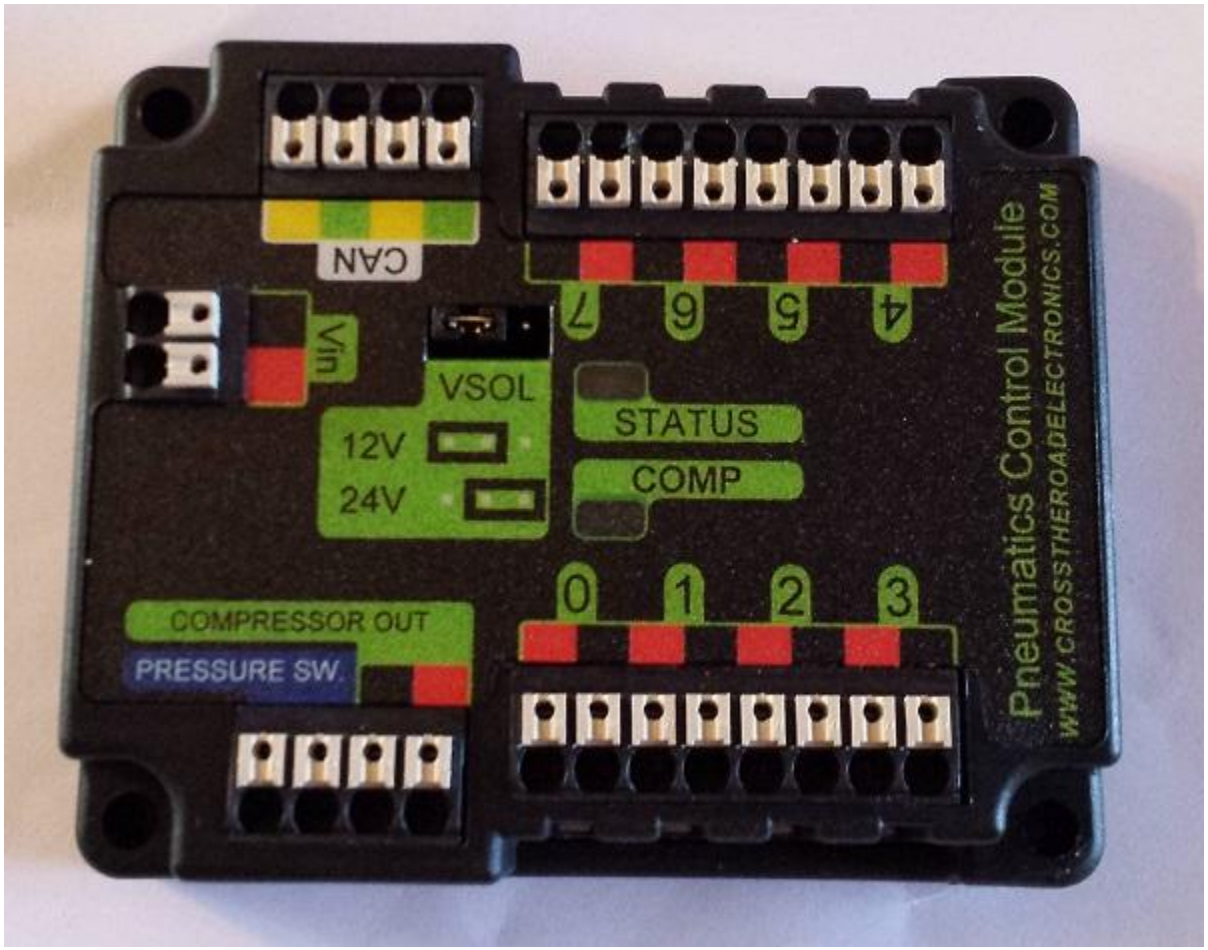

INPUT
CAN
L (GRN)
H (YEL)
I²C
3.3V SDA
SCL
RS-232
TXD
RXD
SPI
SCLK
MOSI
MISO
3.3V
CS0
CS1
5V
CS2
CS3
POWER
STATUS
RADIO
COMM
MODE
RSL
NI roboRIO
POWERED BY
NATIONAL INSTRUMENTS
LabVIEW
DIO
PWM
NATIONAL INSTRUMENTS
ACCELEROMETER
RELAY
FWD
REV
ANALOG IN
RESET
USER
RSL
5V
6V

Power Distribution



Thanks to Team 1718 – Fighting Pi

Pneumatic Control Module



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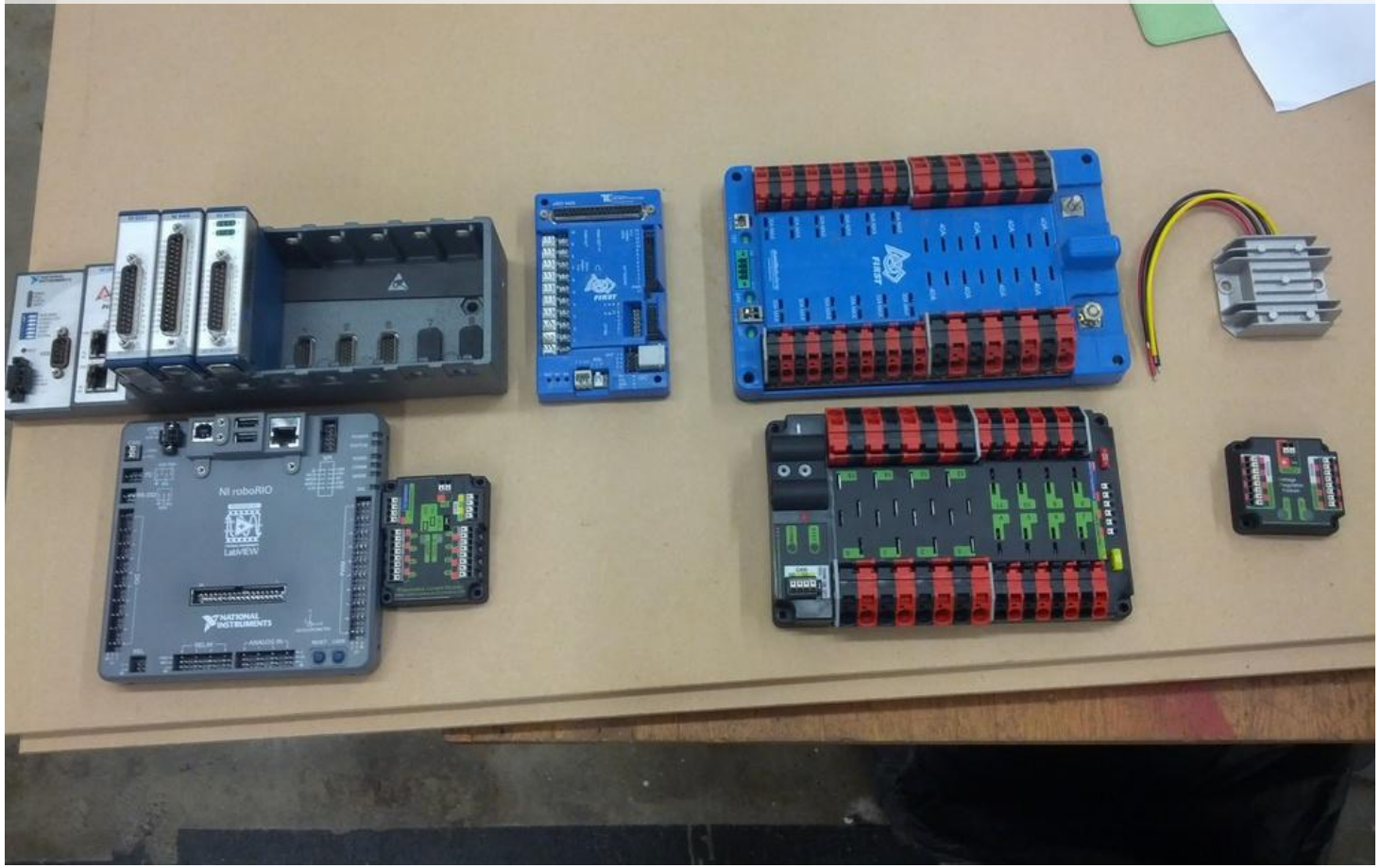
Voltage Regulator Module

Thanks to Team 1718 – Fighting Pi

Size Comparison



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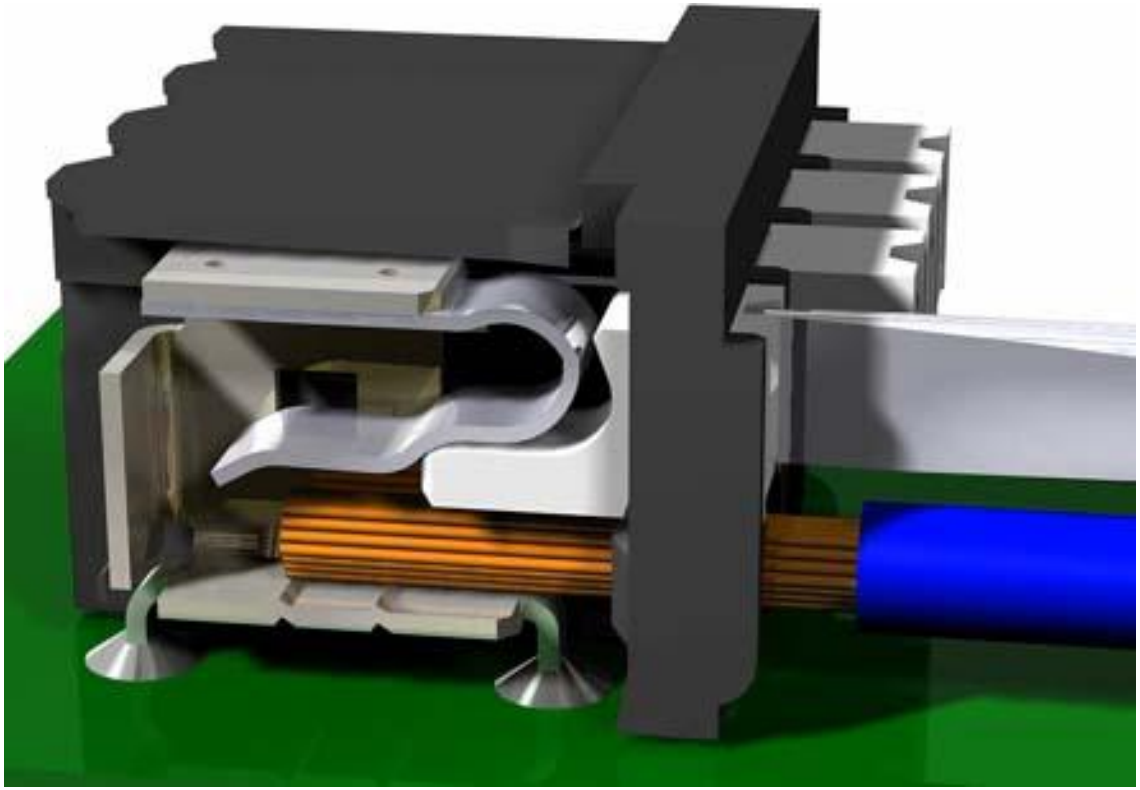
Specifications

	Current Control System (assuming 4-slot cRIO)	2015 Control System
Platform/ Processor	Xilinx Spartan-6 LX45 FPGA Freescale 5125 Power PC, 400 MHz	Xilinx Zynq-7020, Dual-Core ARM Cortex A9, 667 MHz
OS	Wind River VxWorks	Linux with real-time extensions
Cost to Teams (new/ different devices used for comparison)	$893.95 = • cRIO + I/O Kit, $525 • PD Board, $189 • Digital Sidecar, $82 • Analog Breakout Board, $24 • Solenoid Breakout Board, $24 • Spike for Compressor, $34.95 • Voltage converter, $15	$765 = • roboRIO, $435 • PD Panel, $200 • Pneumatic Control Module, $90 • Voltage Regulator Module (if needed), $40
Memory	128MB RAM, 256MB Flash	256MB RAM, 512MB Flash

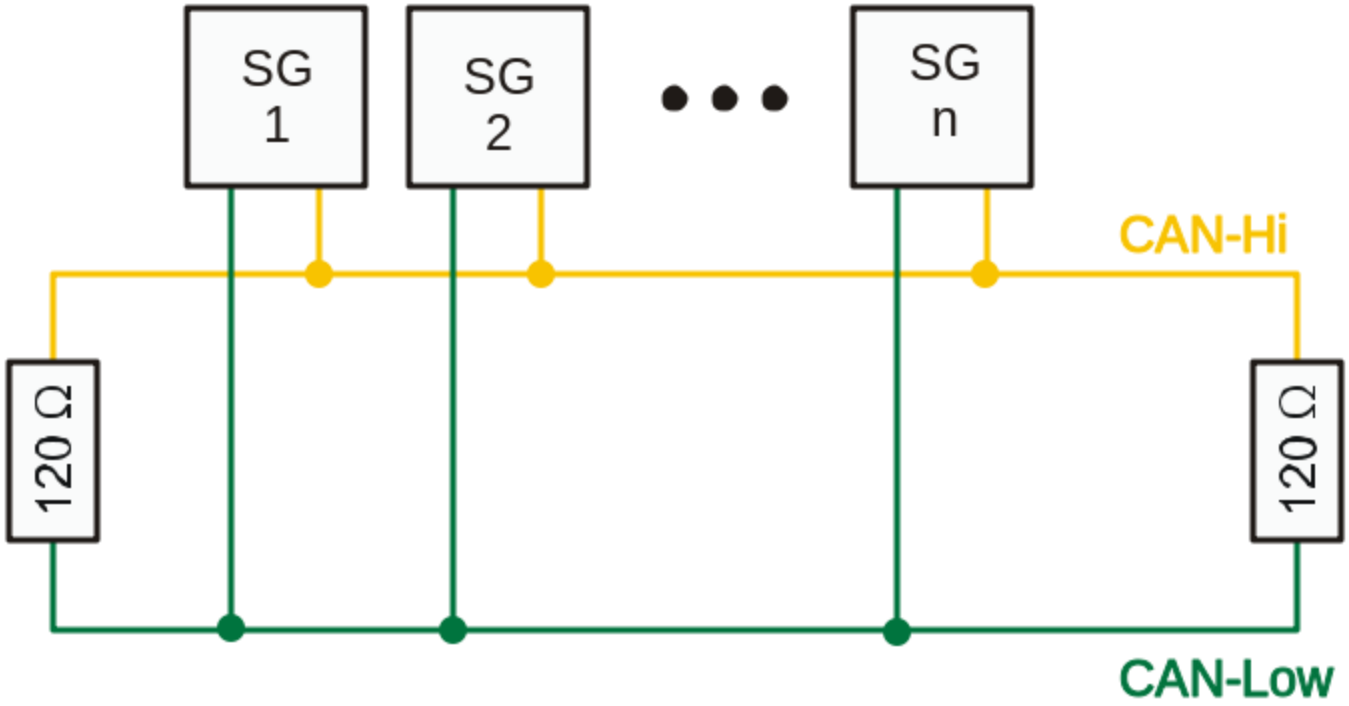
Wire Connections



Wiedmuller LSF-SMT Series

The CAN Bus

Controller Area Network (CAN) bus

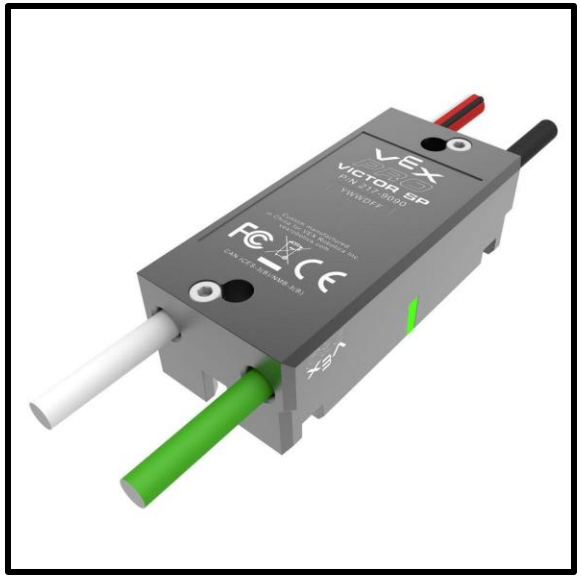


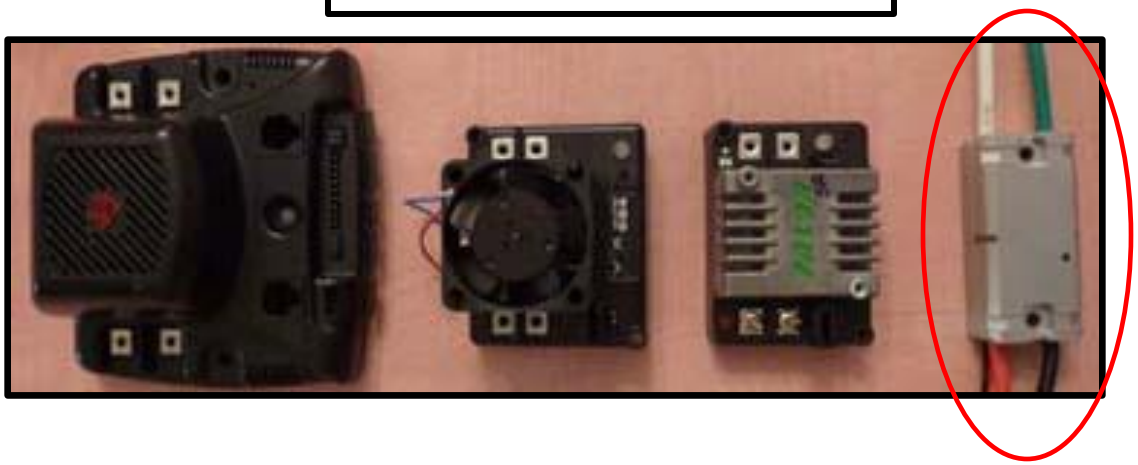
http://en.wikipedia.org/wiki/CAN_bus

New Motor Controllers

- The old Victors, Jaguars & Talons are no longer in production
- FIRST is assessing two new motor controllers for use in 2015
  - The Victor SP (Vex)
    - Uses PWM
  - The Talon SRX (Cross the Road Electronics)
    - Uses CAN
- Identical form factors for both types

Introducing the new motor controllers





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Wireless Bridge

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To Be Determined

- USB dongle based (maybe)
- Existing D-Link bridge (maybe)

Next Time

- Next training date: Saturday Oct. 11
- Time 3:30 – 5:00 pm
- Here at SV Library

- **TOPIC: You decide!**
  - Electronics?
  - Programming?