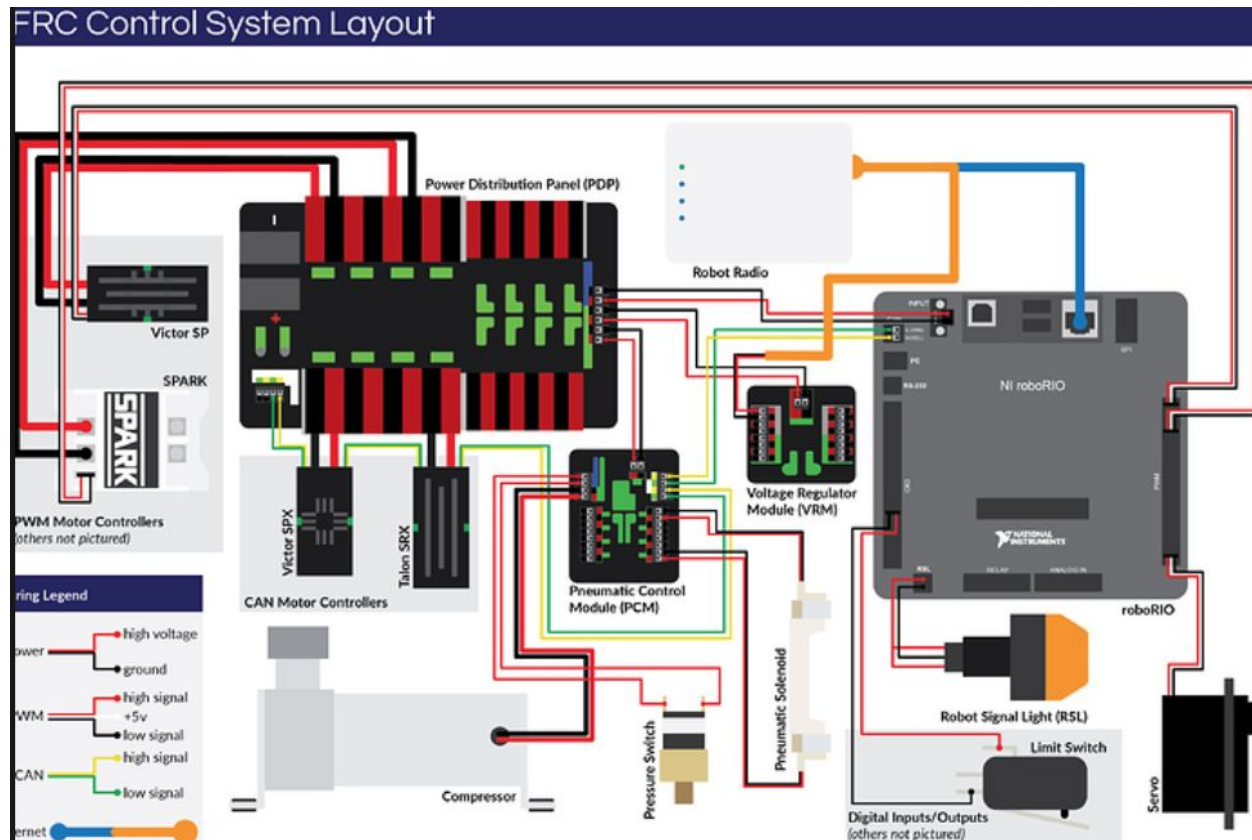


Wiring Walkthrough

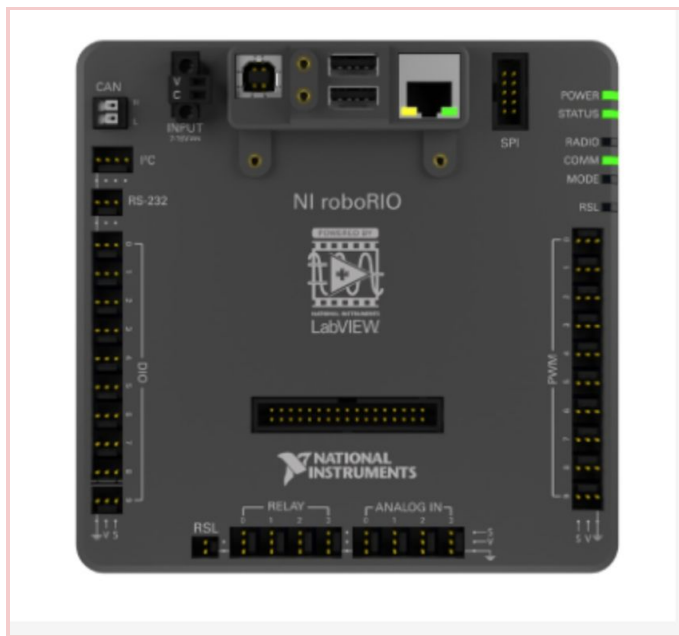


**This is a step by step guide on how to wire the FRC control system. If you wish to learn more about how individual electrical components work, please reference the electronics resource page: https://docs.google.com/document/d/1pVnOrvCO-EYi5hSJW2IseA2DrcfsgTDfV_ghzqh1IKs/edit?usp=sharing **

Warnings and Disclaimers

- DO NOT supply power to a system or any individual components unless you are certain that it is wired correctly. Supplying excessive power to certain components can damage them within seconds, wasting significant time and money needed to order new parts. Always check wiring work before adding power to the circuit. Always ask for approval from sub-team lead or an experienced ARC member before adding power to the circuit.
- Electronics are sensitive to water and the atmosphere around them. Do not drink or eat near the control system.
- If you notice components heating abnormally or giving off smoke, turn off the power supply immediately. Allow components to cool before tampering with them or proceeding with additional tests.

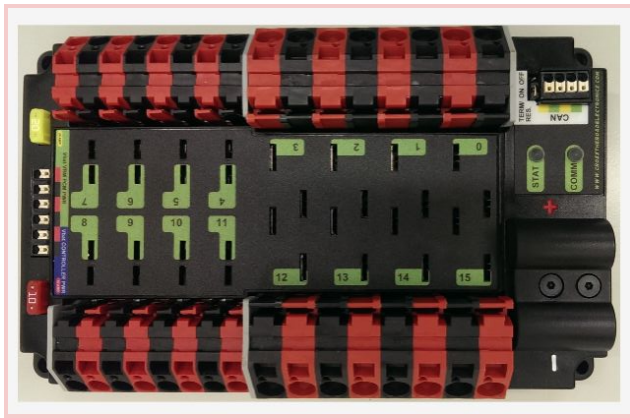
RoboRio



- The roboRIO is the brain of the robot. Code is uploaded to this component.
- To start, note the CAN wire ports in the top left corner of the above image. These are connected to the PCM (see here: <https://docs.google.com/document/d/1Pp2bVIXeYJaLke-CsyJfSJXRG0vjF8iZZDCeoBwepkY/edit?usp=sharing>)

- The two ports labeled 'INPUT' directly to the left on the CAN ports are where the roboRio is given power. The 'V' port is connected to the PDP (see below) via a red power wire. The 'C' port is connected to the PDP via a black ground wire.
- On the bottom left of the roboRio there is a port labeled 'RSL'. This port is connected to the robot signal light. Further instructions can be found in that section.
- All male 'PWM' ports connect pwm motor controllers. For these connections you should use a three wire jumper cable with a female connection. Again, there is more information on this below.
- There is a female ethernet port highlighted with yellow and green marking on the top of the roboRio. This port is used to connect the radio. See more under radio instructions.

Power Distribution Panel (PDP)



- The large ports on the side of the PDP are called Wago connectors. You can watch a video on how to use them here : <https://youtu.be/L3GJGQ7mJqk> The connectors to the right in the above image are larger and accept 10-24 AWG wire while the smaller wago connectors accept 6-12 AWG wire.
- These wago connector ports are used to supply power to motor controllers, which will be looked at in the next section.
- There are four CAN wire ports on the top left of the PDP. Two of them (one green and one yellow) are connected to the CAN wire from the PCM. See the pneumatics wire guide if more information is needed on the PCM. The other two CAN ports are not needed for basic wiring.
- If you look to the left of the PDP above, you will see six ports. These types of ports are called weidmuller connections. You can watch a video on how to use them here: <https://youtu.be/kCcDw3IDYis>
- The first two weidmuller ports (closest to the yellow button) should be connected to the Vin ports on the PCM in order to supply power to the module.

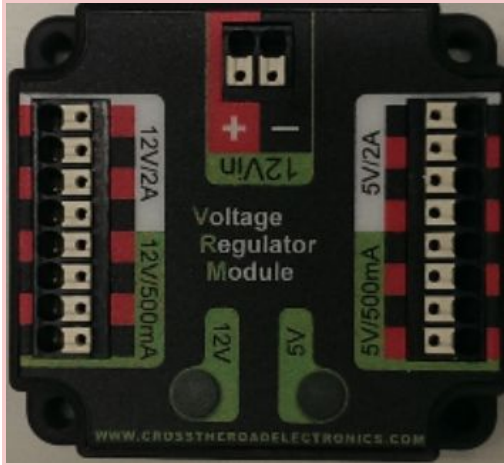
- The next two weidmuller ports should be connected to the '12Vin' ports on the VRM. This can be seen in more detail below.
- The last two ports in the series should be connected to the 'INPUT' ports on the top right of the roboRio. The red port should be connected to the port labeled 'V' on the roboRio and the black port should be connected to the 'C' port.
- The last thing you will have to do is supply power to the PDP via a battery. Unscrew the black cap located in the bottom right corner of the PDP. The positive port on the PDP should be connected to the positive terminal of the circuit breaker module (see below). The negative port on the PDP should be connected directly to the negative terminal of the battery. More technical information on how to create battery connections can be found on the electronics resources page.

Motor Controllers



- The power (red) and ground (black) wires attached to the motor controller should be connected to the weidmuller ports on the PDP. Red goes to red and black goes to black. Make sure to place these two wires in consecutive red and black ports for each motor controller.
- The green and white wires will later be attached to the motors of the robot in order to supply power to them.

Voltage Regulator Module (VRM)

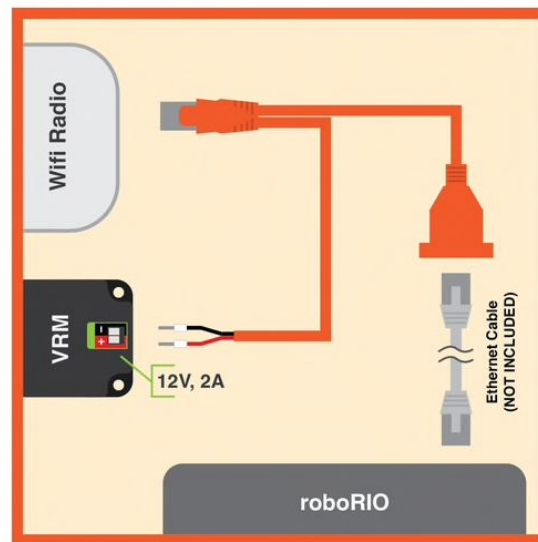


- As seen towards the top of the above image, the VRM has a power (+) and ground (-) port labeled '12Vin'. In these ports, insert the power and ground wires that are connected to the PDP.
- This module is meant to control the voltage that is supplied to the radio of the robot. Connect a ground and power wire to the 12V/2A weidmuller ports shown on the top left in the image above. These wires should be connected to the radio. For this step you should use a PoE wire as seen here: <https://images.app.goo.gl/fi1CfeQCylq9qC3x7>

Robot Radio



- The radio will be given power through the VRM. Insert the male ethernet end of the PoE wire coming from the VRM into the power port on the radio. The male end of the PoE ethernet cable will be attached to the roboRIO via an additional ethernet cable as seen here:



Robot Signal Light (RSL)



- Insert a red wire into the 'La' terminal and attach the other end of this wire into the 'Lb' port. This connection serves as a jumper.
- You will now need a two wire connector that looks like this:
<https://images.app.goo.gl/ELHkAT3zKTBWrLTA8>
 - Strip one end of this connector. Insert the stripped side wires into the RSL. The red wire goes to the 'La' port and the black wire goes to the 'N' port. The female connector end of this wire double wire jumper is then attached to the RSL port on the roboRio. The black wire side should be closest to the edge of the roboRio.

Circuit Breaker (On/Off Switch)



- This module is the on/off switch of the robot. You press the red button to supply power, and press down on the black switch to cut power off.
- There should be a positive red wire lug attached to the port that is to the right above. This is from the PDP. The other port on the circuit breaker is connected via a lug battery terminal directly to the battery (positive terminal).

Notes on Digital Sensors/Motor Connections

- From year to year the addition of special digital sensors may become necessary. This guide walks through the basics of FRC electronics, but do note that expansion of the system beyond this guide is a likely possibility.
- In order to connect motors, you will have to be familiar with anderson connectors. Here is a tutorial on how to use them: <https://youtu.be/HdSSKNfJeTU>