

Team 3176 White Paper

Title: Planning and assembling basic electrical systems	Author(s): Mitch Tennancour, Aden Craig, Luke Ambler, Christopher Harrison
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Abstract

This White Paper™ documents the process for basic electrical team configurations as well as good tips for wiring up the most basic tank bots, with parts including the Roborio, Motors, Power distribution board, Motor controllers, battery, Fuses, dummy light, voltage regulator manager, Radio, and red signal light. The goal is to educate beginning members of electrical in how to start a basic system.

Definitions

Roborio - the brain and controller of the robot.

Power Distribution Board - main power controlling board of the robot, it takes in power from the battery and safely sends it out to systems needing power.

Motor Controllers - usually known as a Talon, these send data to the motors from the roborio that tell them how to spin.

Fuses - a safety measure inserted into the Power Distribution Board that doesn't allow too much power to be sent to any device, and the fuse will break instead of the component.

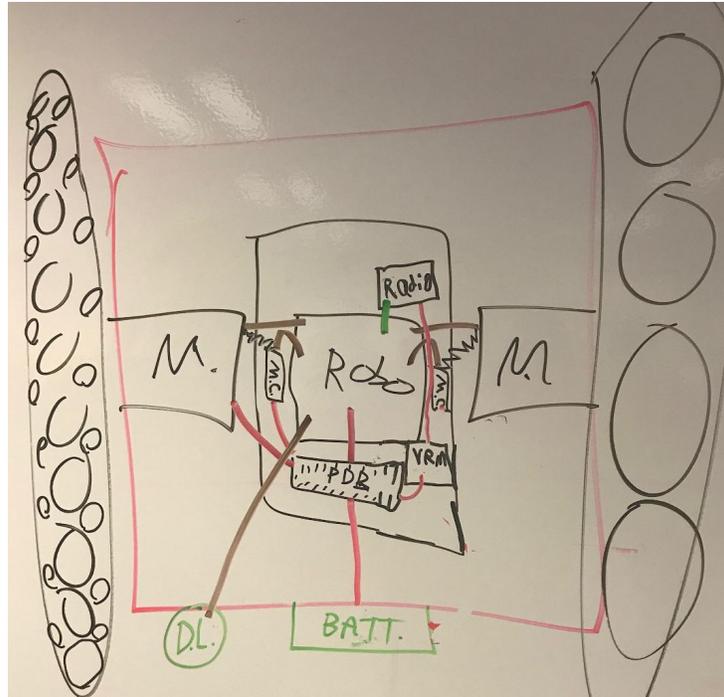
Voltage Regulation Module - a smaller tool similar to the Power Distribution Board, it sends out lower amounts of voltage/amps and we have used it before for LEDs

Radio - a communication tool between the drive station and the robot, this connects to the roborio, and is powered by the VRM.

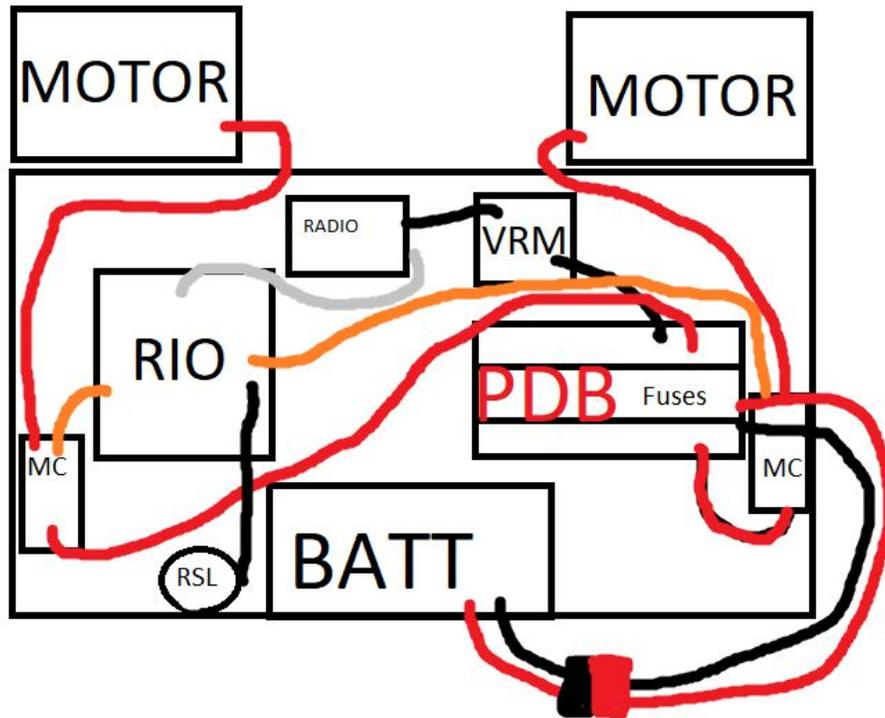
Red Signal Light - a flashing light used to notify the people around the robot is being used.

Board Planning

We begun our planning procedure by drawing out a rectangle for the plastic base where all the electronics would go, then the tracks that the tank wheels would go inside of. Next we drew The, motors and the roborio,we planned it to be in the center where all the wires would be easier to manage as well as to protect it from damage on the field. Next we added the PDB we put it in between the battery and the roborio because it would come in contact with those first. Next we drew on the Motor-Controllers, these we put between the motors and the Rio because they will have to connect those first. Then we added the VRM near the PDB because it connects to it first, it then needs to output to the radio. We placed the radio closer to the Rio to connect it there. Last minute we placed the RSL or Dummy light, in the back of the robot where it would be most visible.



After drawing up all the pieces we made connections using different colors of wires to show what the purpose is, red being power from the PDB, brown being power and data that connects to the RoboRio. Next is setting up power. Then we have PWM wires, that are squiggly black lines below is a more accurate representation of the robot.



Wiring

We then began wiring the components, using mostly 22 gauge wires. CAN wires are yellow, green, and transport data. Power wires are red, black, and transport power. The ethernet cable is what connect the radio to the RoboRio, transports power, data to the radio, and is either white or a shade of gray. Important note: you most likely will not need to strip and crimp the ethernet cable. The stripping process means grabbing wire strippers, lining it up with the correct gauge, making sure you have enough room the make a crimp, make the cut and pull the wire out, which should leave the wiring exposed and ready to be crimped. The crimping process means grabbing crimpers, the right size crimp for the wire and port (easily recognized by color (orange is the best for 22 gauges and most ports)), putting the crimps in the top of the wire until it covers all of the exposed wire and gently pushing it until it stops moving. Then grab the crimpers,

position the metal part of the crimp in to the hole, squeeze the handles and the crimp should be successful. All that's left to do is plug in the wire to the right port and you are done.