

Milestone #9 – Electrical Fabrication

DUE: 17 April (After Patriot's Day)

DESCRIPTION:

You are in the final stages of completing your vehicle! What should be left at this point is fabricating your electrical system. Using the plan of power-side wiring you made last week, please assemble your power electrical system consisting of the batteries, main/auxiliary switches, motor controllers, and motor. **Ask questions if you need it – this high-power work can potentially damage your motor controller and battery if wired incorrectly.**

DO NOT POWER ON YOUR VEHICLE UNTIL YOUR POWER SYSTEM HAS BEEN INSPECTED BY AN INSTRUCTOR!

Even though your battery has a fast fuse, it only takes a split second of reversed-polarity (“plugging it in backwards”) to permanently damage motor controllers. I will also check for proper insulation/termination of wires so there are no chances for shorting or sparking.

Please complete the **signal side** wiring diagram for your vehicle. The procedure is similar to the power side diagram you have made already – indicate what connections to components need to be made, using which method (soldering, 0.1” header terminals, etc). *The “signal side” is defined as any component which does not directly interface with battery or motor.* This includes throttles/other rider input methods, Hall sensors for the motor, any intervening circuitry such as microcontrollers, etc.

- Indicate which pins/connections signals must be routed to (e.g. “Kelly THR pin”) and its “pin number” if applicable.
- Any additional switches, buttons, and whirlygigs needed (e.g. reverse switch, series-parallel bridging contactor set) should be included and connected to the correct places.
- If you are using an Arduino microcontroller, indicate which pins your signals are being connected to. In pseudocode or flowcharts, describe the operation of your program (No executable code is required at this time)

Complete vehicle Solidworks Model: The **finished** SW model of your vehicle is due. **Finished** means assemblies are fully constrained, there are no “blank template” parts, all holes have mating features (e.g. a corresponding hole). The amount of detail you put into it is up to you, but here are some guidelines:

- All major vehicle parts have to be present. Steering components, braking components, drivetrain components, seating/piloting and electronics mounting arrangements must be present.
- All parts must at least have basic mounting dimensions. For instance, your motor can be a cylinder with another cylinder as the shaft, but it should at least have mounting holes at the correct spacing.

- All moving parts - wheels, steering columns, linkages, etc. should move as they do in real life (Modeling brake movement is not necessary). For instance, gear/rotation mates between pulleys and correctly mated steering links.
- Include a motor controller model, battery placement and mounting structure models, and power switch/access port holes and features if applicable. No other electrical parts are required.
- There is no need to add fasteners, teeth to your pulleys and belts, individual balls in the bearings, etc. More detail does not necessarily imply better grade.

FORMAT OF DELIVERABLE:

- 1-2 pages documenting your progress with electricals – pictures are encouraged!
- Your complete vehicle Solidworks model (**collapsed into one compressed folder!** Use “Pack and Go” in Solidworks)
- Your vehicle’s **signal** electrical system plan.

OTHER ACTIVITY: Office hours on Friday will focus on throttle/signal hookup as well as sensor board mounting and other electrical loose ends.

RESOURCES:

For students using Kelly controllers, refer to the Kelly Controller user manual for an example hookup diagram: <http://kellycontroller.com/mot/downloads/KellyKBSUserManual.pdf>

Note that the example is not directly applicable to our vehicles – it will be clear if you just copied the example diagrams without understanding which parts are required!