PRELAB #9: Moving Towards *Elegant Circuit Builds*

Name/NetID:

Section AB/BB:

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8   9   A   B   C   D   E   F

(circle one)

Elegant Circuit Build

Engineering done well utilizes art as much as it does science. When designing and constructing a device, one needs to especially consider "human factors" including such items as safety, perception, ergonomics, and interpretation. We need to consider these aspects from both the viewpoints of the final customer as well as other engineers working on your team. Here, we will focus specifically achieving a board layout and associated wiring that is attractive to the eye and easy to interpret and debug.

When prototyping an electronics project, your early prototype might appear to be a "rat's nest" of wires as seen in Figure 1. You do not want your circuit in this state for very long. Long wires are easily knocked out, long bare component wires will short against each other, and poor selection of wire colors makes circuit debugging extremely difficult.
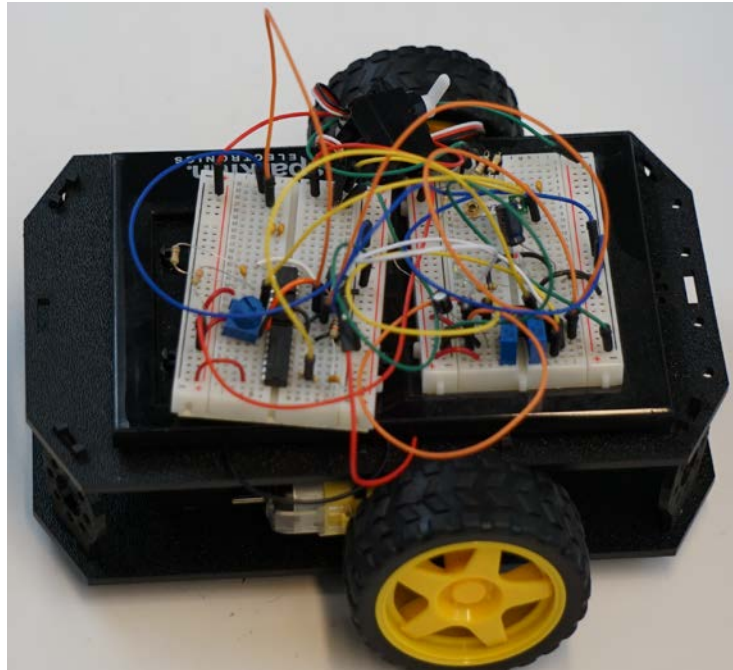

Figure 1: *Typical "Rat's Nest" of wires.*

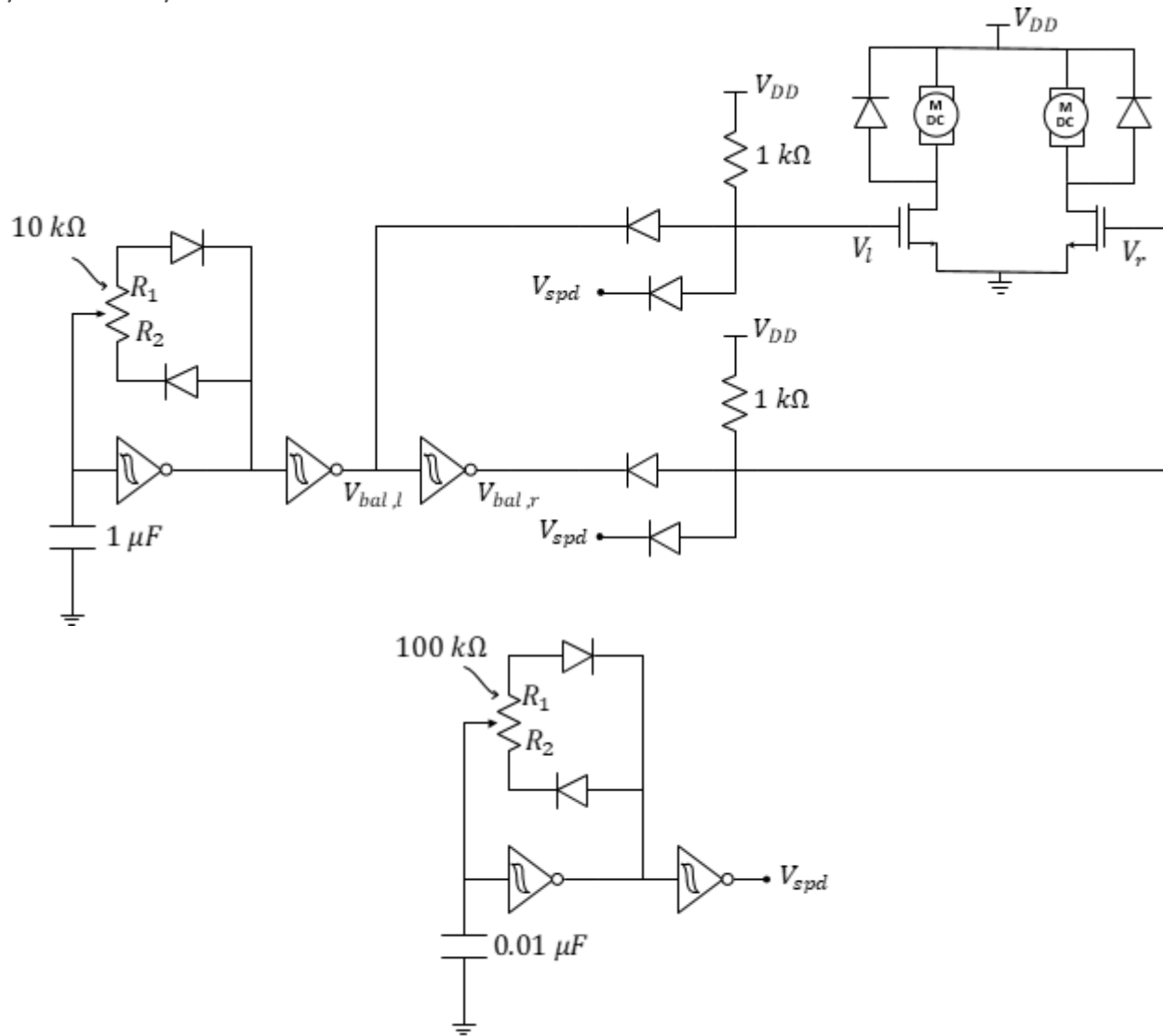Circuit Layout Plan for your Car

Figure 2: *PWM-based wheel balancer plus speed control.*

Consider your motor-drive circuit that now includes PWM-based wheel balance and speed control. Without the pressure of lab time, consider how you might improve the board layout by sketching a physical layout on one of the boards below. Indicate the wire color you would use and show how you would keep the wire and lead length short. How else might you use wire colors to make your board easier to read? This short video will give you an idea: https://www.youtube.com/watch?v=ver-Av8vr1Q
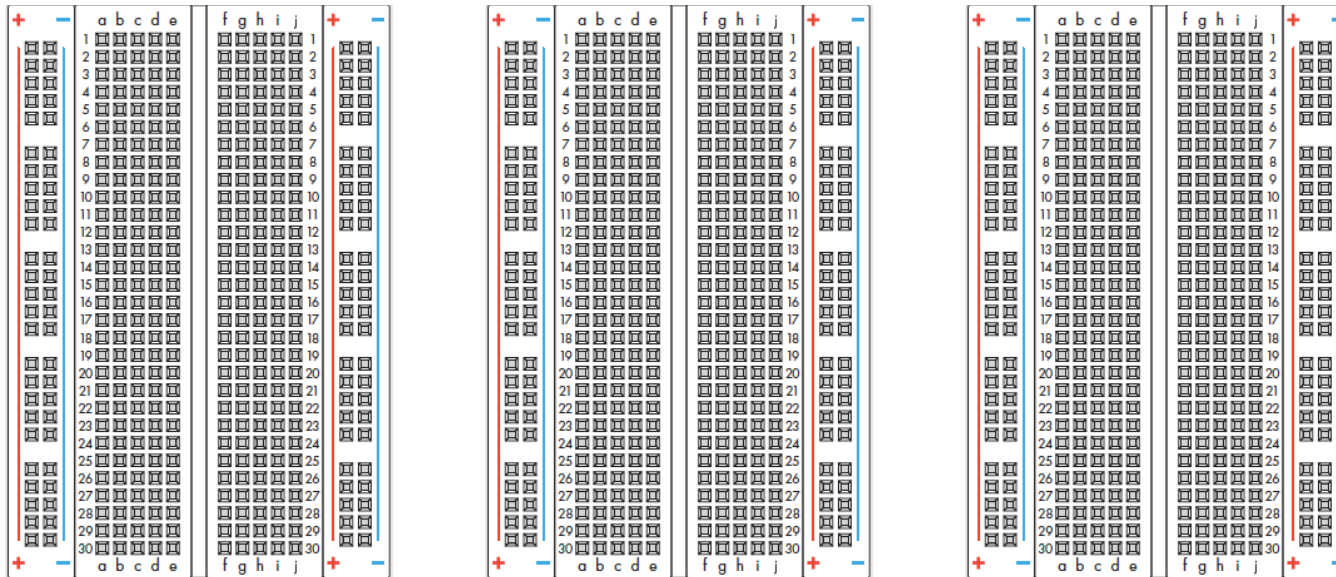

Figure 3: Use these breadboard images for planning one or more circuit layouts of Figure 2. Alternately, you might use a software like "Fritzing".
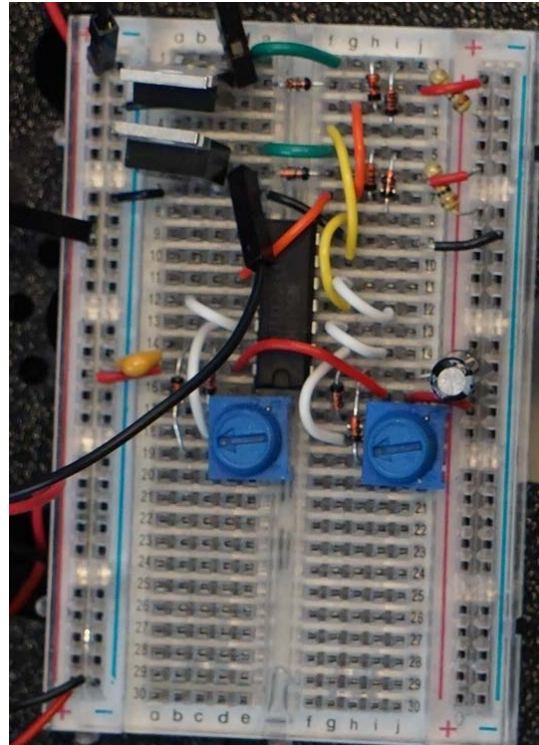
Figure 4: A clean circuit implementation of everything in Figure 2. Your layout need not match.

Build your circuit on your breadboard. You will be given some time to complete it in lab, but it should be mostly completed at home. As always, bring your circuit to the next lab session for grading.

Learning Objectives

- Learn and apply skills that will improve presentation of a circuit design.