Stepper Motor Driver.

The objective of this write up is to explain how to drive a stepper motor from an Arduino. The situation is that the output pins of the Arduino are not capable of supplying the current required to drive a stepper motor. For example the stepper motor used in the project kit can draw 0.9 amps, with the Arduino rated at 0.005 amps (5 milliamps). This drive discrepancy will be addressed with a motor driver that will take the input from the Arduino and drive the current needed by the motor.

The basic structure of the driver is known as an H-Bridge and is shown in Figure 1.

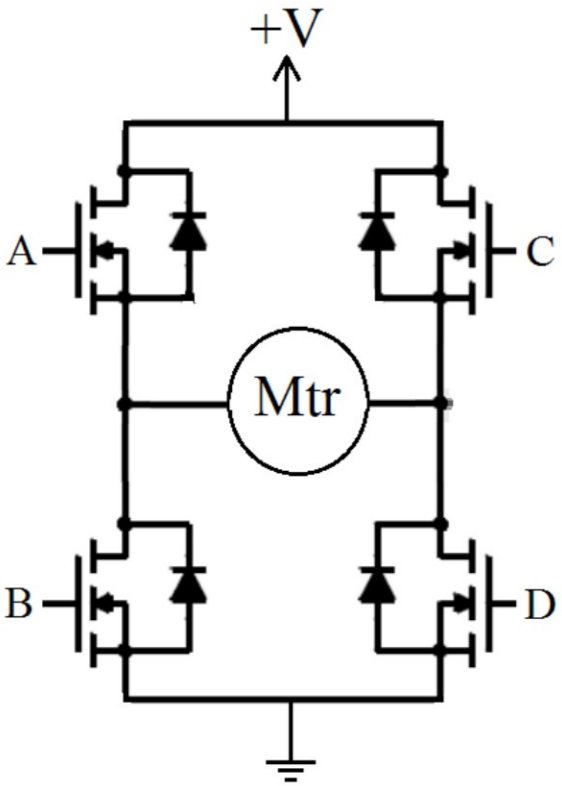

Figure 1. Schematic of an H-Bridge

In the schematic you should be able to see the H. Now the legs are made with Field-Effect-Transistor's (FET's), which can be thought of as switches, and either open (not conducting) or closed (conducting). So if we were to activate FET A and D and not B and C we would have the set up shown in the left side of Figure 2. The converse would be activating B and C but not A and D this would be the case on the right hand side of Figure 2. It can be seen in Figure 2 that the voltage on the motor would be reversed in the two cases shown in Figure 2.

In the case of the stepper motor, we have two windings that need to be activated in a pattern where at one time we need +V on one side and ground on the other, then later the reverse. Thus each winding on the stepper motor needs to be driven by and H-bridge. Thus we will use a board that has two H-bridges and costs a whole $5.

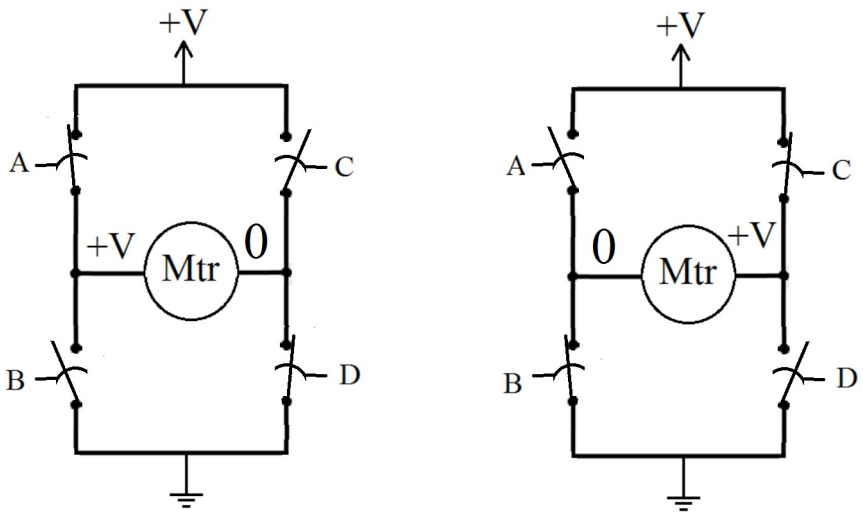

Figure 2. Two Basic Operating States

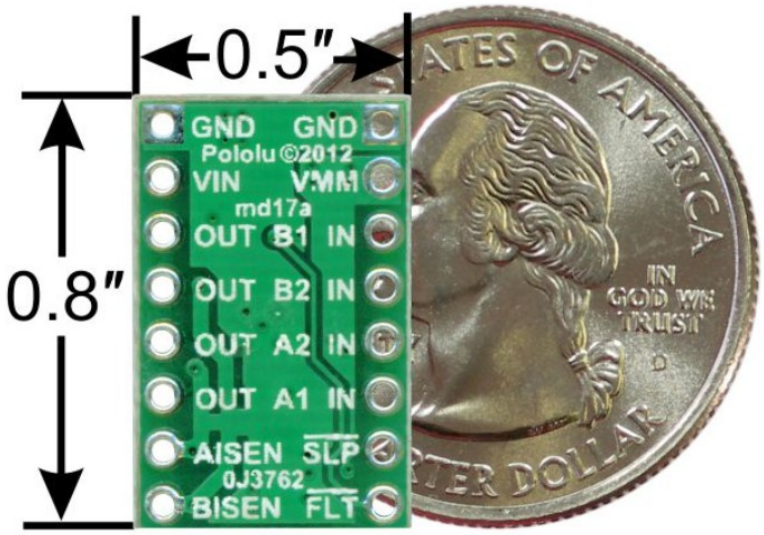

Figure 3. Pololu Motor Driver Board.

In Figure 3, we can see the Pololu driver that will be used in the towel dispenser. The real information about how we will use the driver can be seen in Figure 4. In our application each of the windings from the stepper will replace one of the DC Motor's. Another important thing to note is that the numbering on the driver in the dispenser diagram is based on each side with the ground pin (GND) as pin 1.

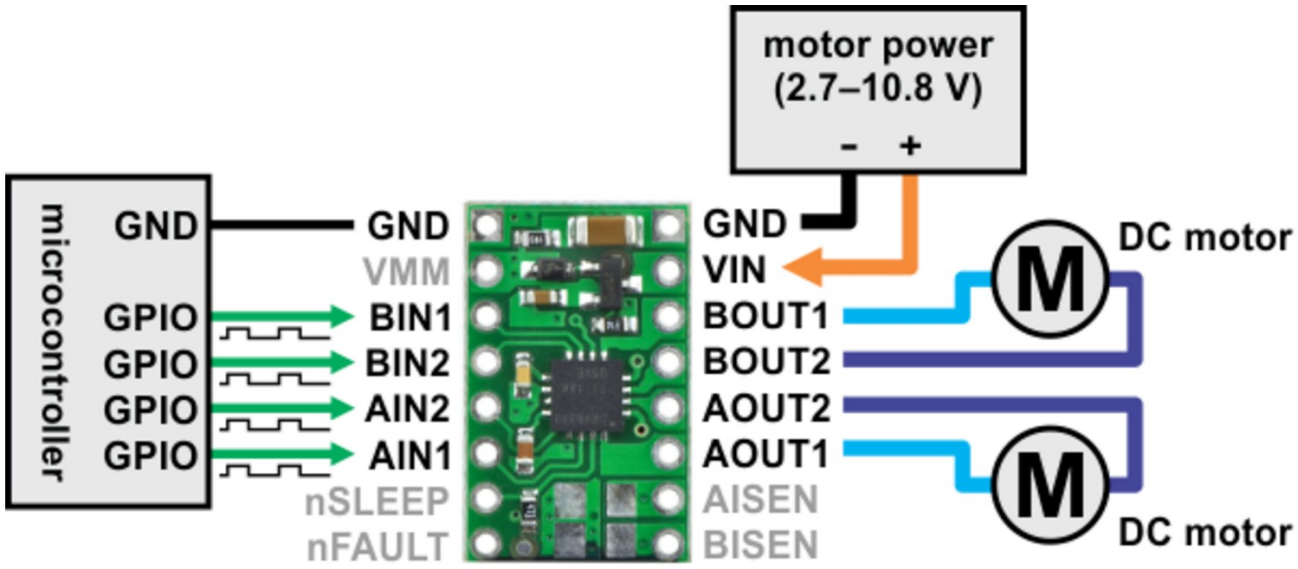

Figure 4. Vendors Basic Circuit for Driver.

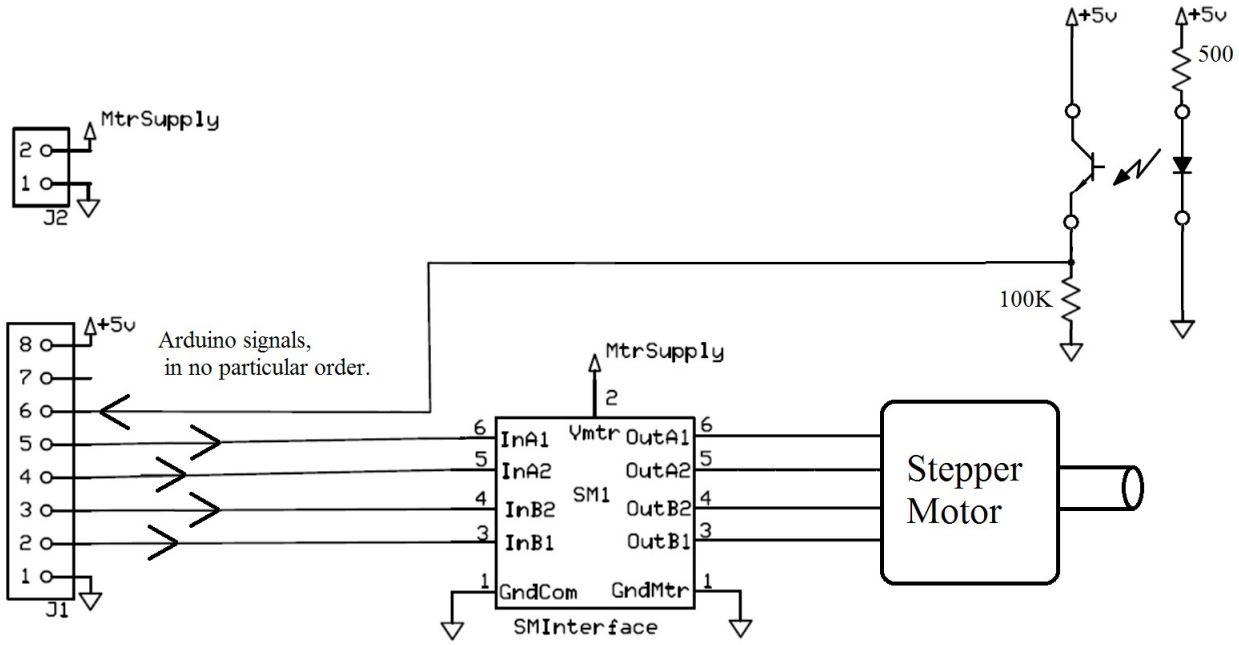

Figure 5. Schematic for the Dispenser.