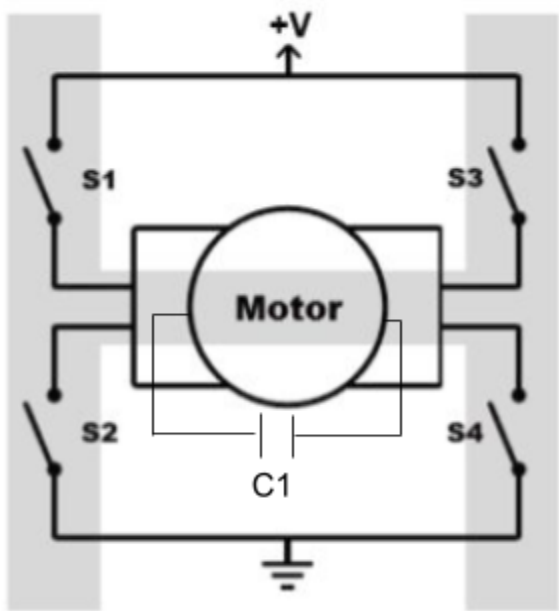# H-Bridge Lab

Wire the circuit below on your breadboard. You are going to use your USB cable to power the circuit.

S1, S2, S3, and S4 are switches.
C1 - .1 microfarad capacitor

You can use two of these to represent S1 and S2:

For S3 and S4, you can use the red top push buttons (PB N.O.):

You will need to get an extra red top PB in class to complete this task.

+V in this case represents the +5V output pin on the Arduino Uno. You will just be using the Arduino for power. There is no programming component to this lab.

A value of 0 for S1, S2, S3, and S4 signifies that the button is not pressed. A value of 1 means that it is pressed. Fill in the chart with your observations.

S1	S2	S3	S4	Observation (Direction of motor spinning)
0	0	0	0	No spin
0	1	1	1	No Spins
0	1	1	0	Spins left
1	1	0	0	No spin
0	0	1	1	No Spin
1	0	0	1	Spins Right

Which combinations cause the motor to spin? Is it in the same direction or is it different? Use tape or another identifying marker to tell.

Combination 1 and 4 as well as 2 and 3 cause the motor to move. 1 and 4 causes the motor to spin to the right and 2 and 3 causes the motor to spin left. This is due to the change in the poles of the magnetic field as we change the terminal of where the current is induced.

**Which combinations do not cause the motor to spin? Why do you think so?**

The combinations including:
1 and 2
2 and 4
3 and 4

H-Bridge Lab

CHALLENGE CIRCUIT: You can achieve the same result by using transistors to replace the switches. The NPN transistor you have already used in your Motor Arduino lab. It is a TIP31C. In pairs you will wire this one. You need an extra NPN transistor, two PNP transistors, and two extra 1K resistors.

NPN (TIP31C)

PNP (TIP42C)
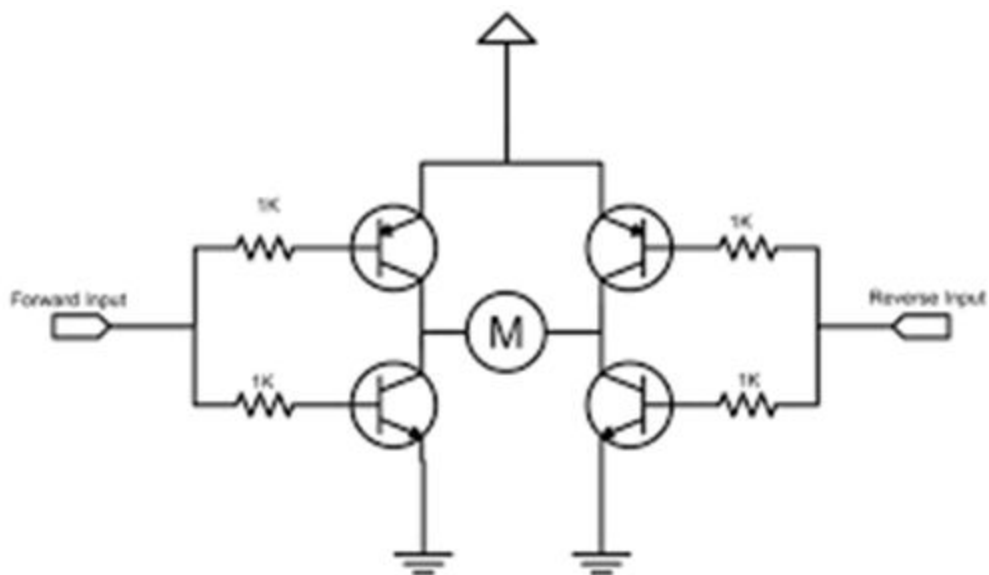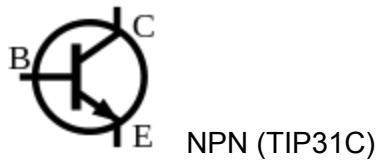
What combinations of the forward and reverse input make the motor spin?