

COMP470: Mobile Robotics

Spring 2019

Lab 1: Robot Assembly

The purpose of this lab is to assemble and test the robot that your team will use for the remainder of the labs in this course. Each team will receive a kit containing all the parts needed to build the robot, a set of tools, and a laptop computer. These will be yours for the rest of the semester, so please return to your numbered locker at the end of each lab.

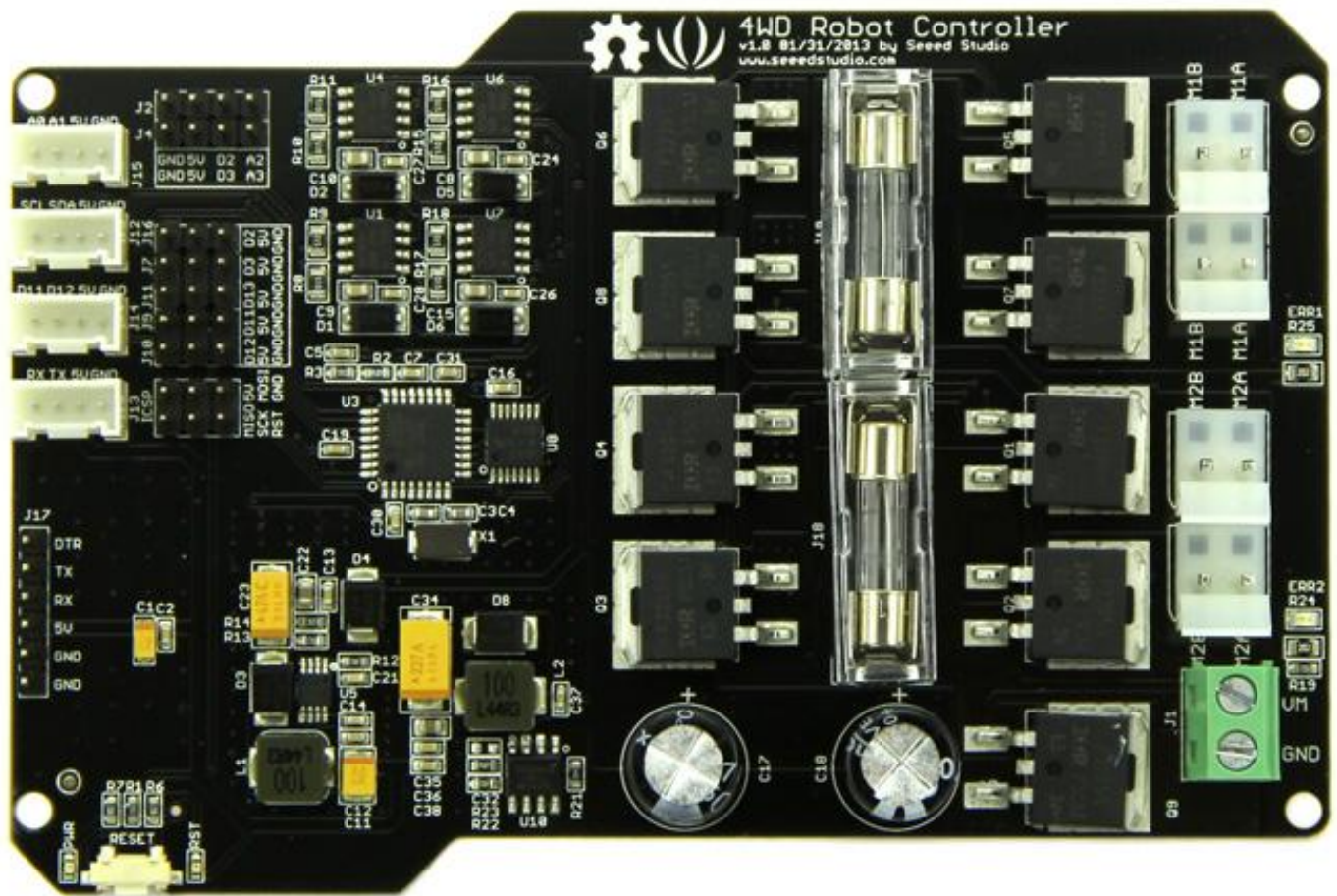
Your robot is called the **Skeleton Bot - 4WD hercules mobile robotic platform**.



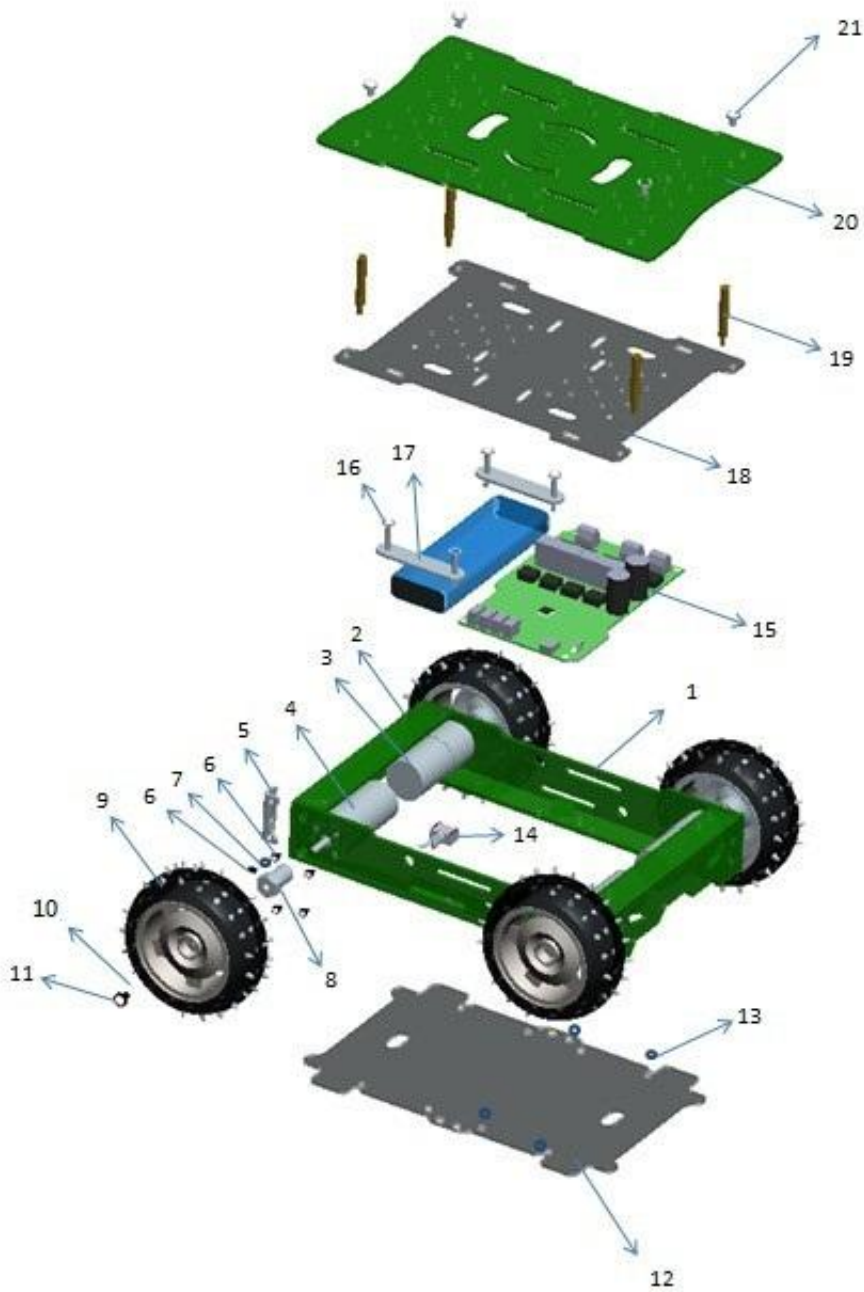
Your kit should contain the following parts:







Parts List

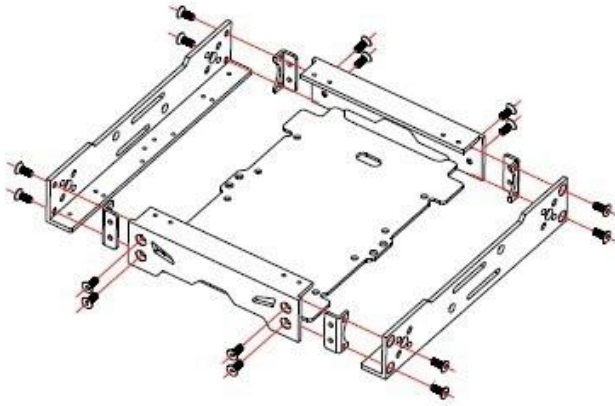


Item Number	Parts Name	Specification	Material	Quantity
1	Bracket-1	2003520mm*3.0mm	L Aluminum extrusion 6061	2 pcs
2	Bracket-2	1353520mm*3.0mm	L Aluminum extrusion 6061	2 pcs
3	Reducing-Motor	25GA-370	310rpm DC6V stalling torque: 70kg	2 pcs

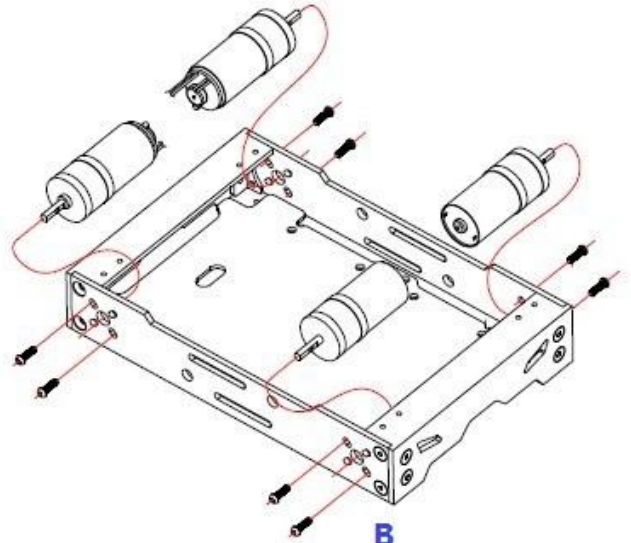
4	Reducing-Motor with encoder	25GA-370	310rpm DC6V stalling torque: ≥ 7.0 Kg.cm	2 pcs
5	Bracket Adapter Plate	29122.0mm	cold rolled plate	4 pcs
6	Screw	3*10mm	Metal	30 pcs
7	nut	M3*2.5mm	Metal	4 pcs
8	Motor-connector	$\Phi 4$ mm W12mm L18mm	Metal	4 pcs
9	Wheel	$\Phi 85$ mm*W31mm	plastic+rubber	4 pcs
10	Spring Shim	$\Phi 7$ mm* $\Phi 4$ mm	Metal	4 pcs
11	Screw	M4*8mm	Metal	4 pcs
12	Under-plate	1991292.0mm	Tea black Acrylic	1 pcs
13	washer	$\Phi 5.0 \Phi 35$ mm	PA	4 pcs
14	power swith	/	/	1 pcs
15	Hercules Dual 15A 6-20V Motor Controller			1 pcs
16	Screw	M3*21mm	Metal	4 pcs
17	Acylic-plate	53122.0mm	Transparent Acrylic	2 pcs
18	cover-plate	1841322.0mm	Tea black Acrylic	1 pcs
19	Cu pillar	M3*30mm-6mm	signal stud	4 pcs
20	Top-plate	2161381.5mm	AL plat	1 pcs
21	Screw	M3*21mm	Metal	4 pcs
22	Screw-driver	M3-85mm	/	1 pcs
23	Screw-driver	2.5-53mm	/	1 pcs
24	Power cable	150mm	/	1 pcs
25	wire	160mm	/	1 pcs

Assembly Diagrams

Please follow the steps in the diagrams to assemble your robot.



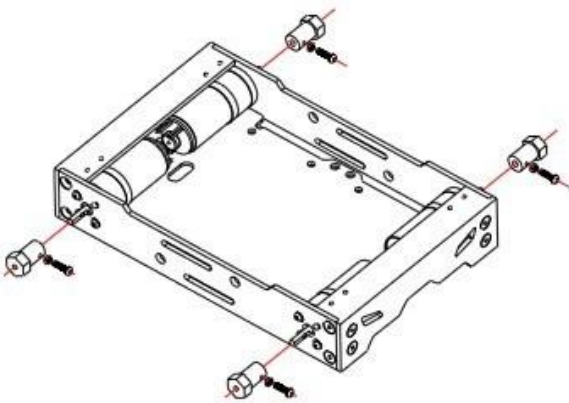
A



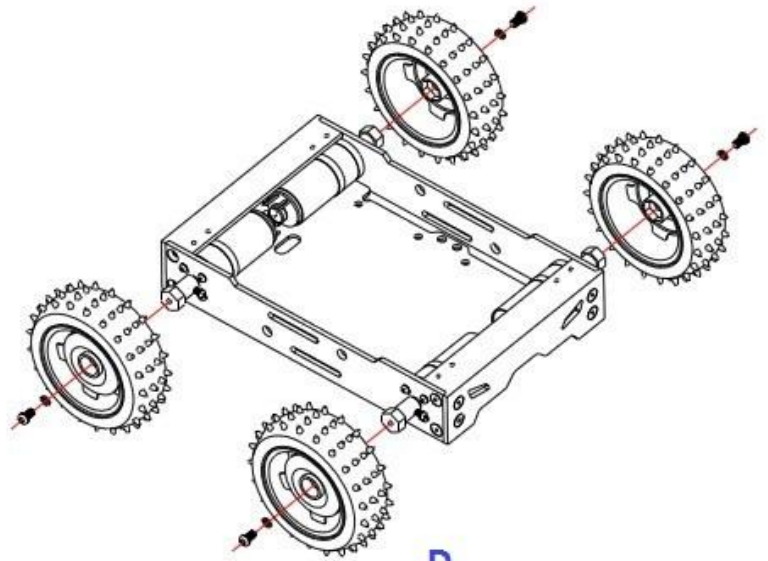
B

1) Please stop after Step A to have instructor check your work. The placement of motors in Step B is important, so don't move on to Step B until instructed.

2) Please stop after Step B to have instructor check your work.

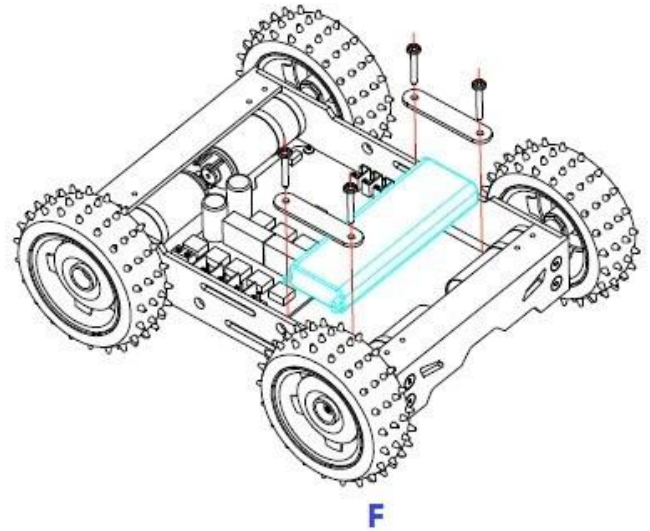
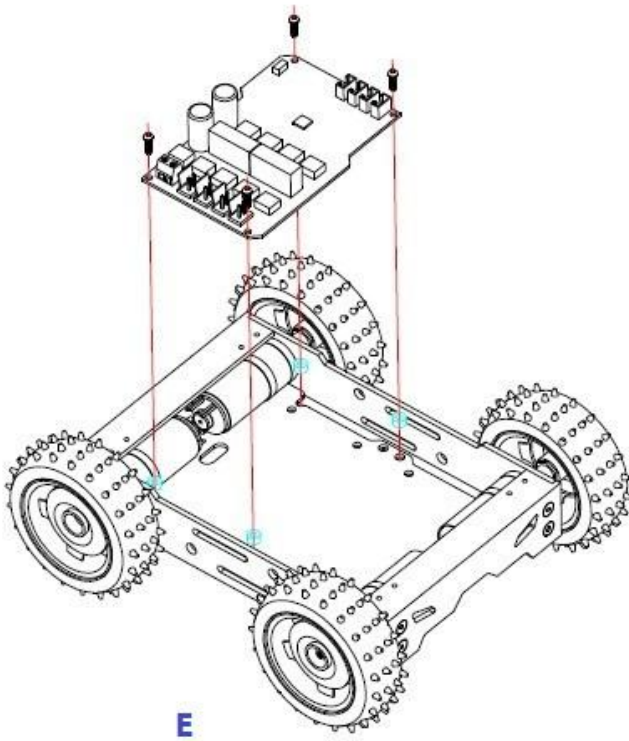


C



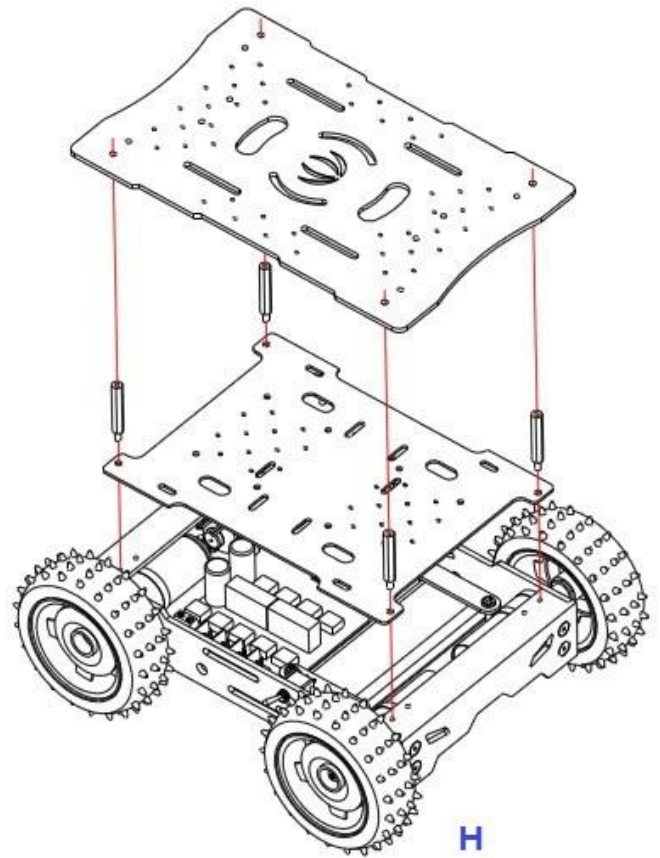
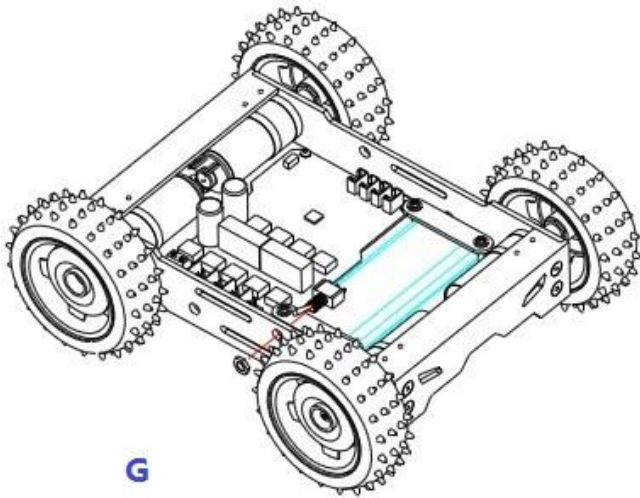
D

3) Please stop after Step C to have instructor check your work. 4) Please stop after Step D to have instructor check your work.

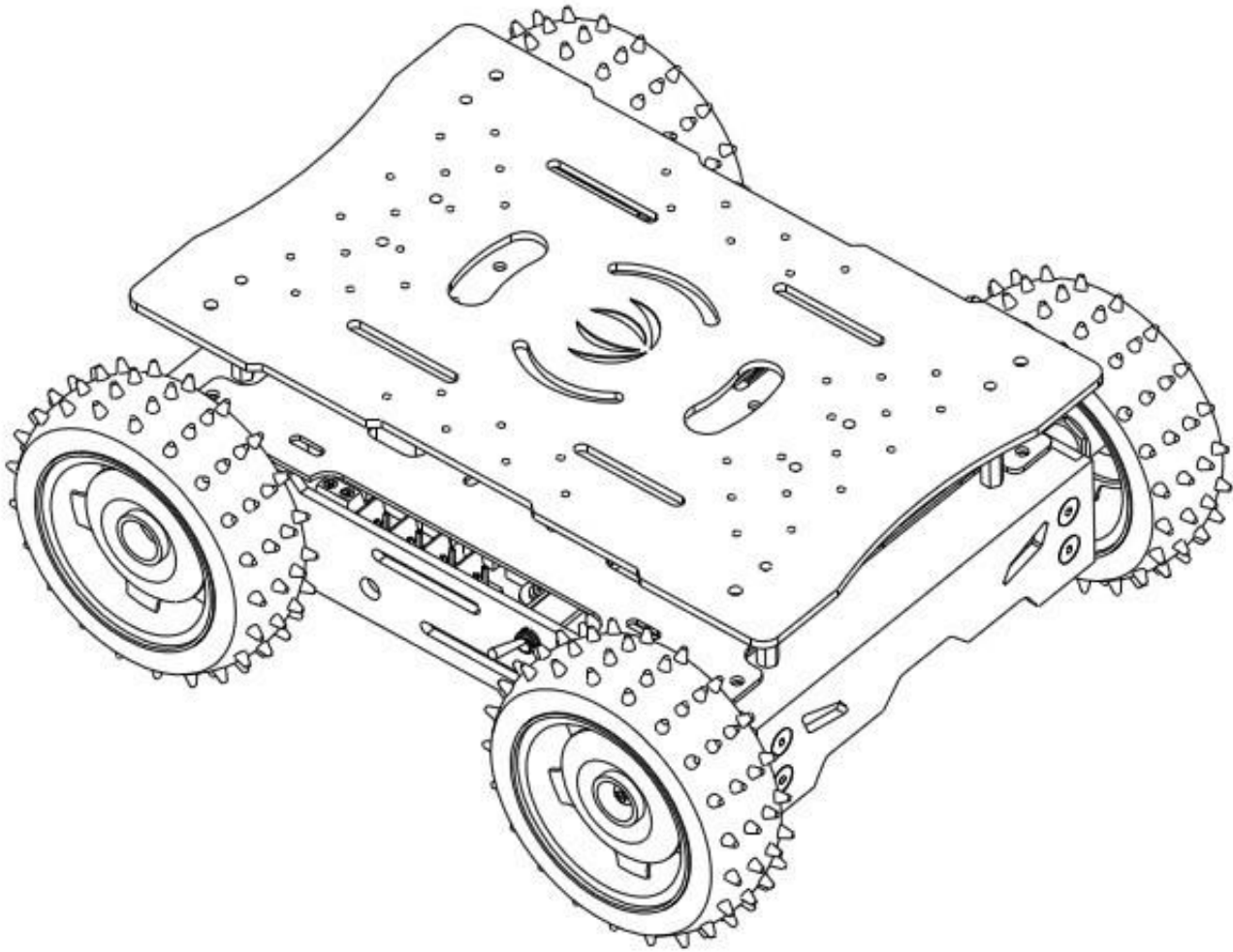


5) Before doing Step E we will want to install most of the cables and connectors onto your circuit board. I will go over the circuit connections on the whiteboard. Please stop after Step E to have instructor check your work.

Note in Step F. There is only a single bracket to hold your battery in place. Place it on the end nearest the wires of the battery.



When finished your card should look like this:



Software Test

- 1) Download the zip file of the repository at this [URL](#). Do not clone the repository. Simply download the zip file.
- 2) Open the Arduino IDE on your laptop and follow the directions for Importing a .zip Library [here](#).
- 3) Connect your laptop to the USB-Serial board and upload the following example code.

```

/*
 * Demo of Hercules control DC Motor
 *
 * Loovee
 * 2014-6-27
 *
 * This demo will show you how to control a DC motor
 * you can connect 2 DC motor here, both of they will go
 * a direction for 3s the turn reverse for 3s
 *
 * This demo use the following function:
 *
 * void setSpeedDir(int ispeed, unsigned char dir);
 * - ispeed - speed, range 0-100, that mean pwm in %
 * - dir - DIRF(0x00) or DIRR(0x01)
 */

#include <Hercules.h>

void setup()
{
    MOTOR.begin();                // initialize
}

void loop()
{
    MOTOR.setSpeedDir(30, DIRF);   // pwm: 30%, direction DIRF
    delay(3000);
    MOTOR.setSpeedDir(30, DIRR);   // pwm: 30%, direction DIRR
    delay(3000);
}

```

Note: Don't turn on the switched to run this code until you have disconnected the USB cable and placed your robot on the ground. Otherwise your car will drive off the table.

If you are unfamiliar with Arduino IDE please ask instructor to explain steps for running first program.

Appendix: Circuit Diagram

