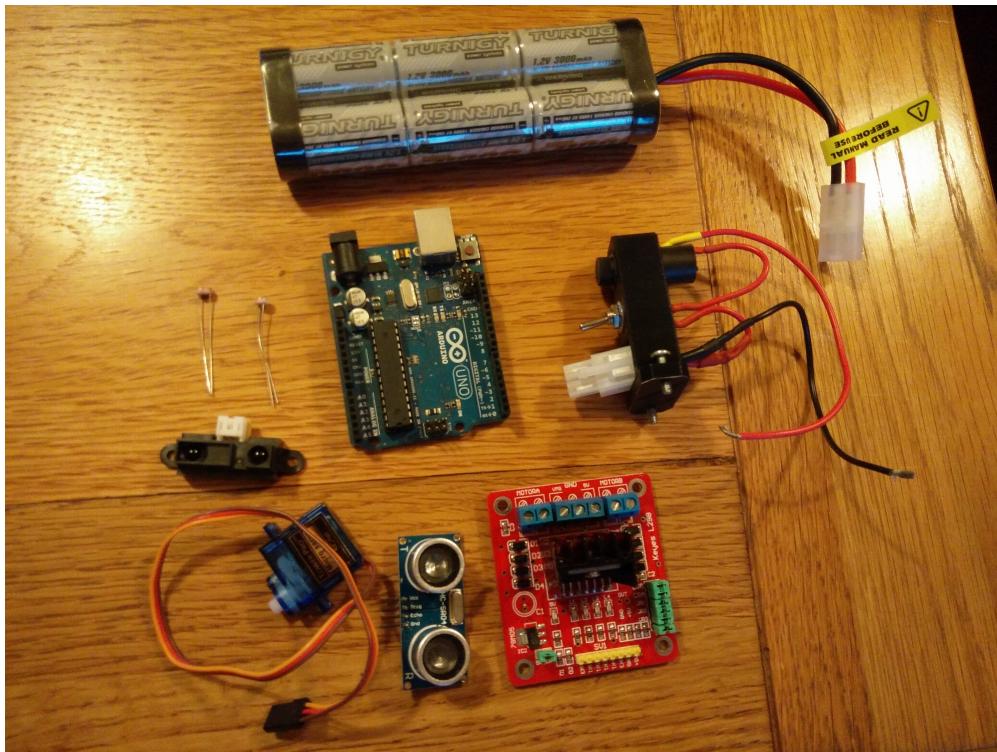


# Aberystwyth Robotics Club - Magician Chassis Red - Electronics Instructions

## Hardware Required

Below is an image of all the items of hardware needed for the Magician Chassis robot.



This includes:

- Nickel Metal Hydride Battery - 7.4v, 3000mAh
- Motor Controller - H-Bridge
- Fuse and connector holder
- Servo Motor
- Ultrasonic
- Infrared
- LDR x2

Some hardware will be handed out when required (just to keep you and the hardware safe).

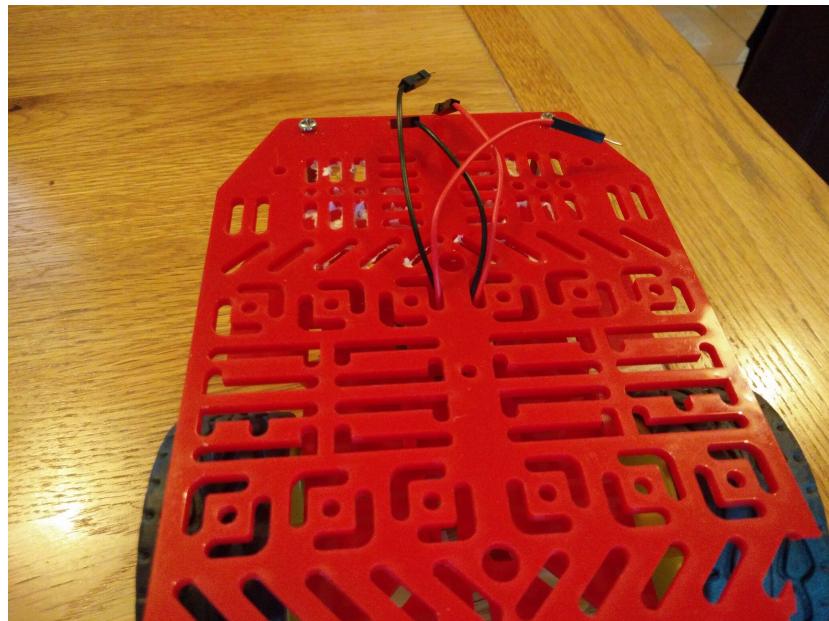


## Control Systems

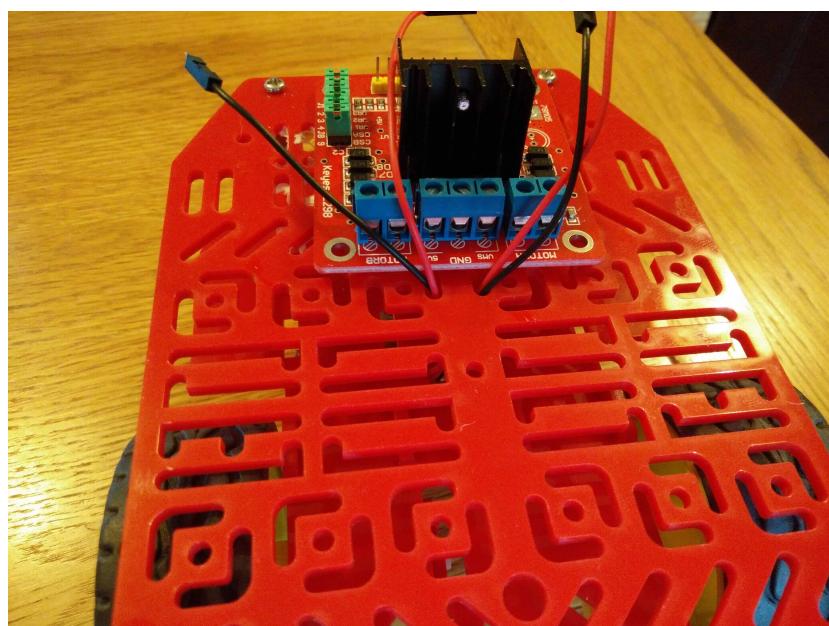
1. Pull the motor cables through the pre-defined holes in the chassis.

This will allow us to plug it into the motor controller.

If there are no cables connected to the motor, you will need to solder the cables to the tags on the motor. Ask a helper if you need a hand with the soldering.



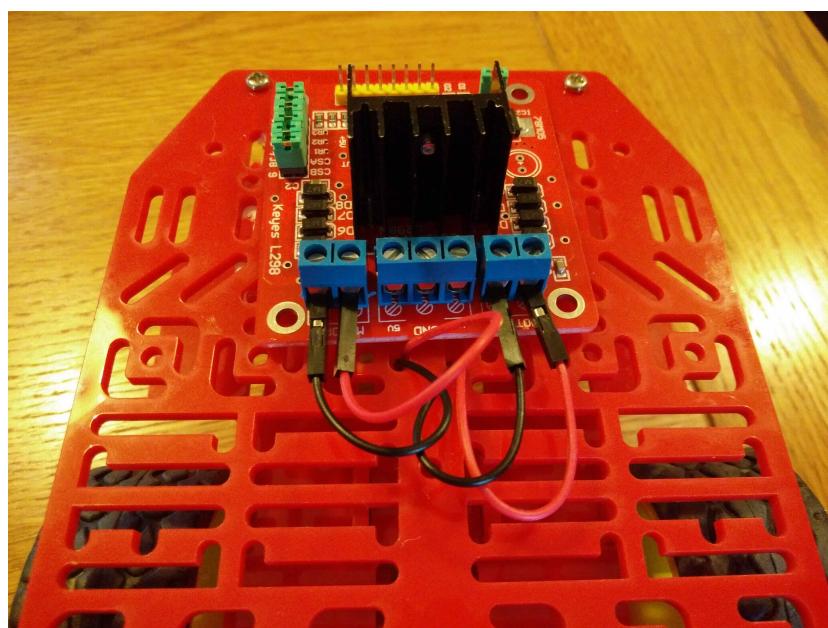
2. Position the motor controller in an area where the cables from the motors can comfortably reach the controller.



### 3. Connect the motors to the motor controller.

In the picture below it has been wired in the following way.

Motor Cable	Motor Controller Pin
Left Motor - Red	OUT1
Left Motor - Black	OUT2
Right Motor - Red	OUT3
Right Motor - Black	OUT4



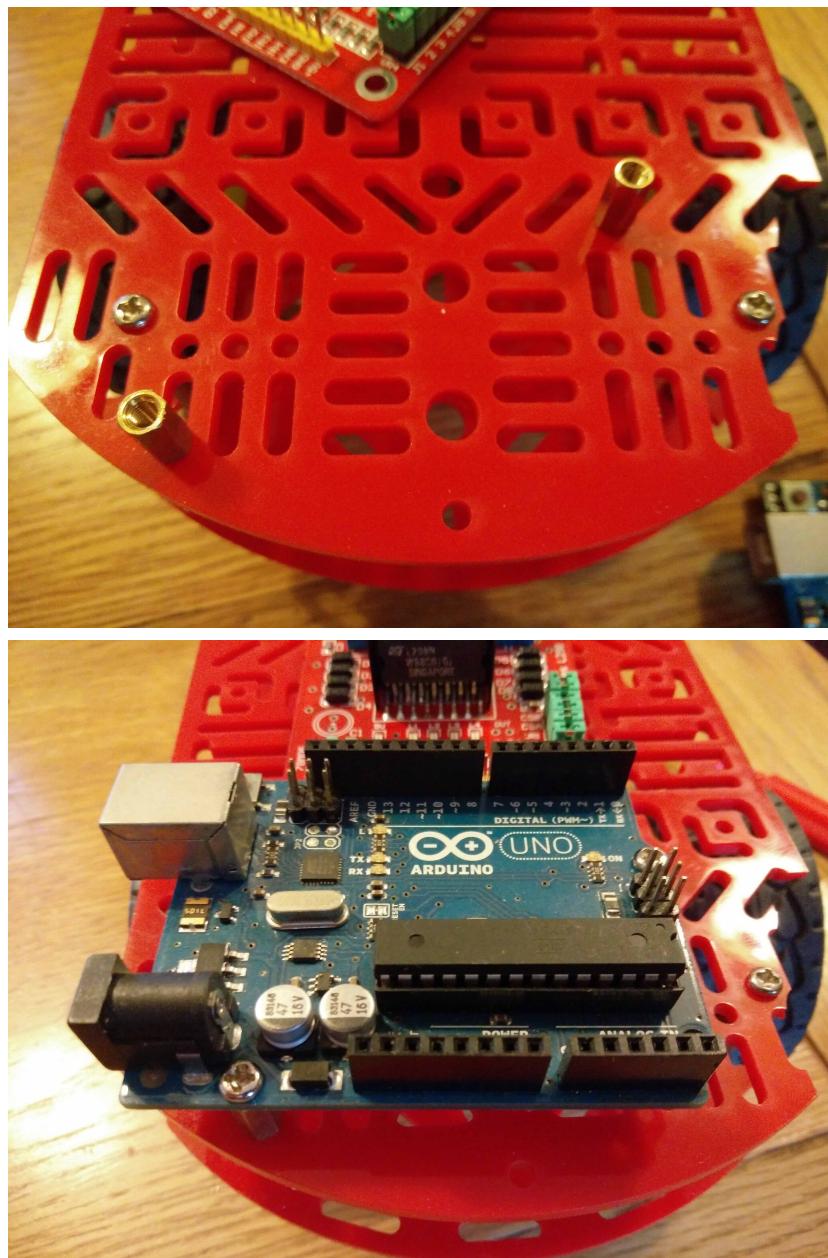
These cables are outputting power from the motor controller to the motors to make them move.

#### 4. Position the Arduino.

We now need to add the brains to our robot. As we will be connecting the Arduino to the motor controller to send signals, the motor controller and the Arduino will need to be close together.

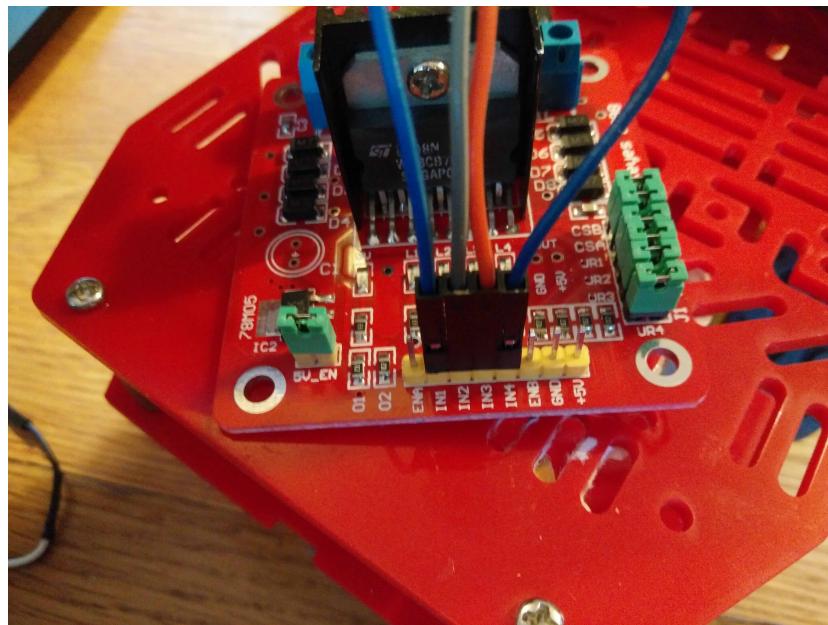
To raise the Arduino off the plastic we use the golden spacers.

Ensure that the USB port is accessible so you can programme the Arduino later on.



## 5. Connect cables to the motor controllers

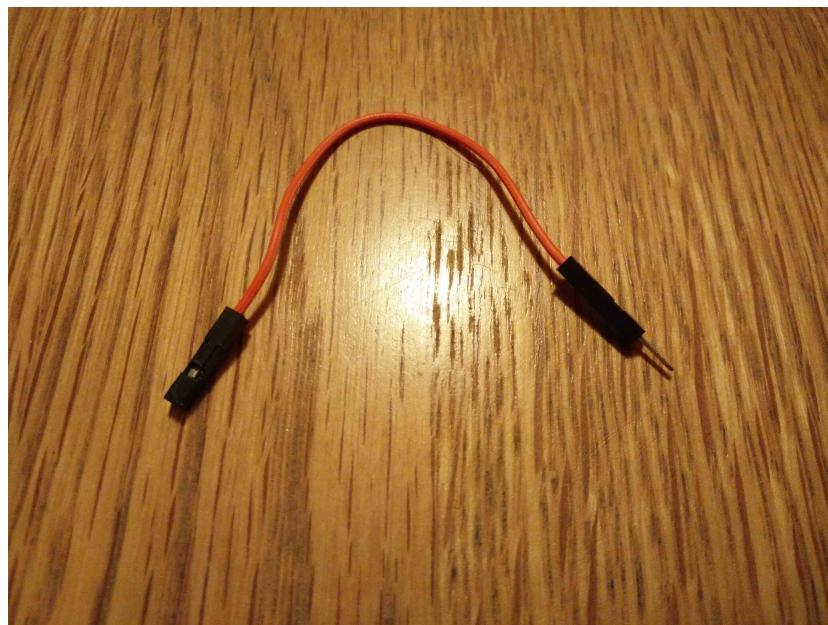
There are 4 pins sticking out of the motor controller, each one represents a cable on the motor.



You will now need 4 new cables.

Using the female-to-male jumper cables, connect the cables from left to right as seen in the picture above.

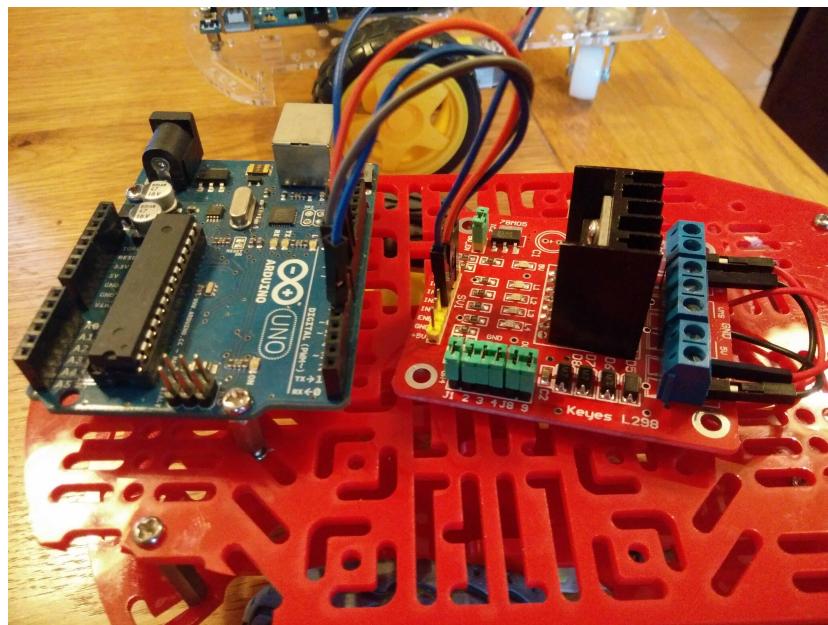
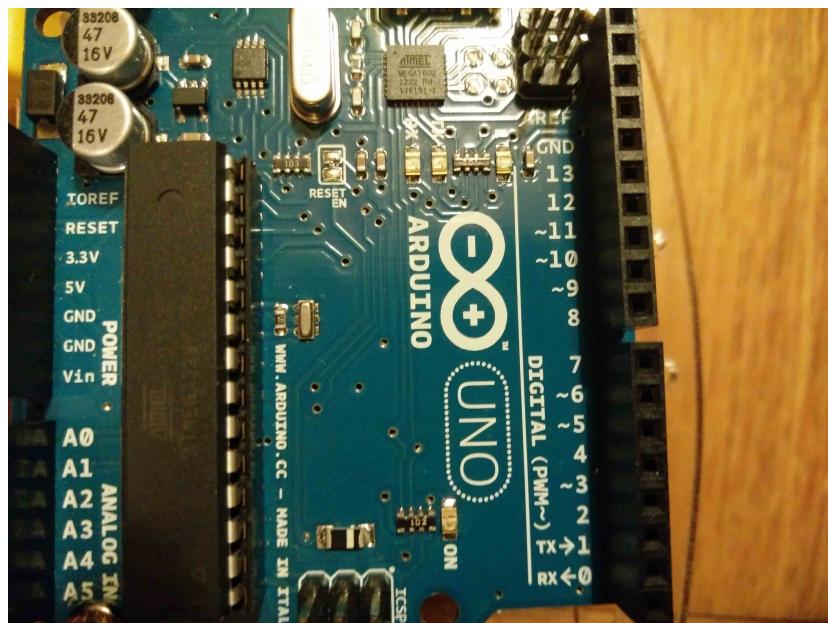
An example of these cables can be found in the picture below:



**6. Starting from left to right on the motor controller, connect this up to the Arduino.**

Below is the digital pin layout for an Arduino Uno.

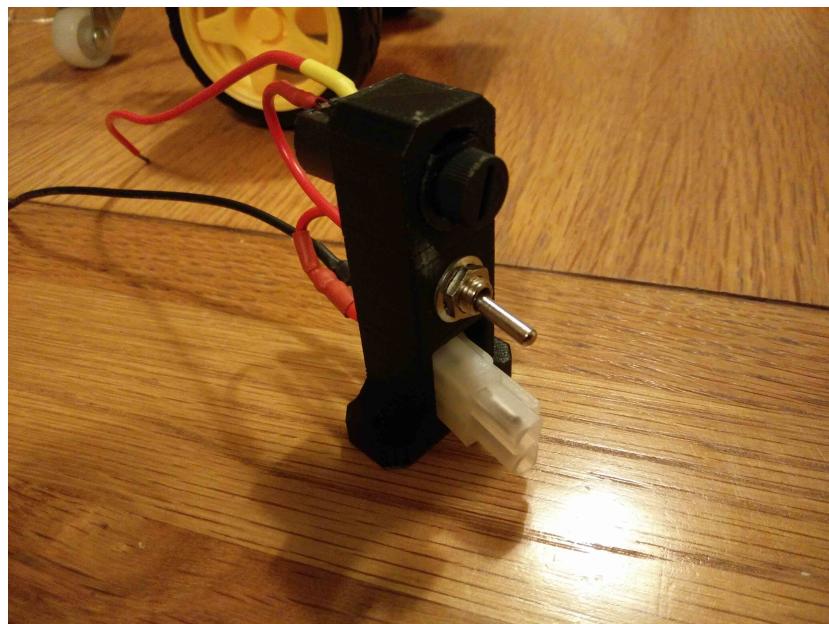
Motor Controller	Arduino Pin
Motor Controller 1	Arduino ~5
Motor Controller 2	Arduino ~6
Motor Controller 3	Arduino ~9
Motor Controller 4	Arduino ~10



**7. Connect the red cable from the power block into the VIN plug.**

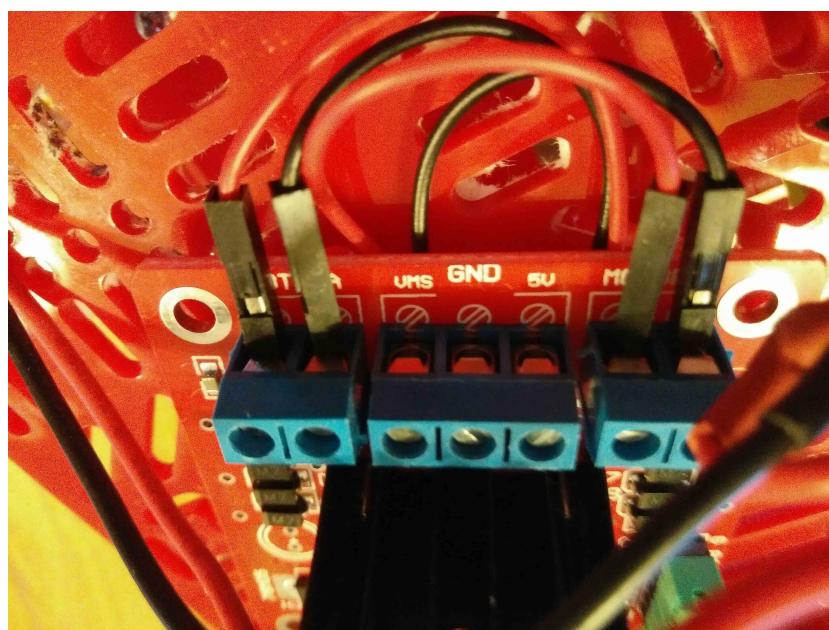
The blue sockets on the motor controller are labelled VIN, GND and +5V. This step will supply 7.4 volts from the battery into the motor controller.

The power block acts as the gateway between the battery and the motor controller. This includes a connector to remove the battery, a switch to turn the robot on and off, and a fuse to ensure the battery and circuit remains safe.



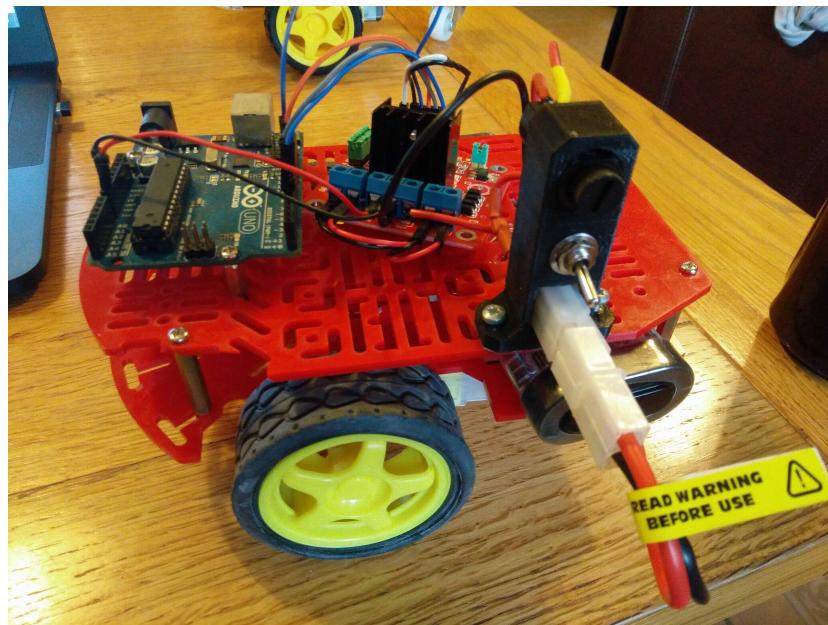
**8. Connect the black cable from the power block into the GND plug.**

This will act as ground from the battery.



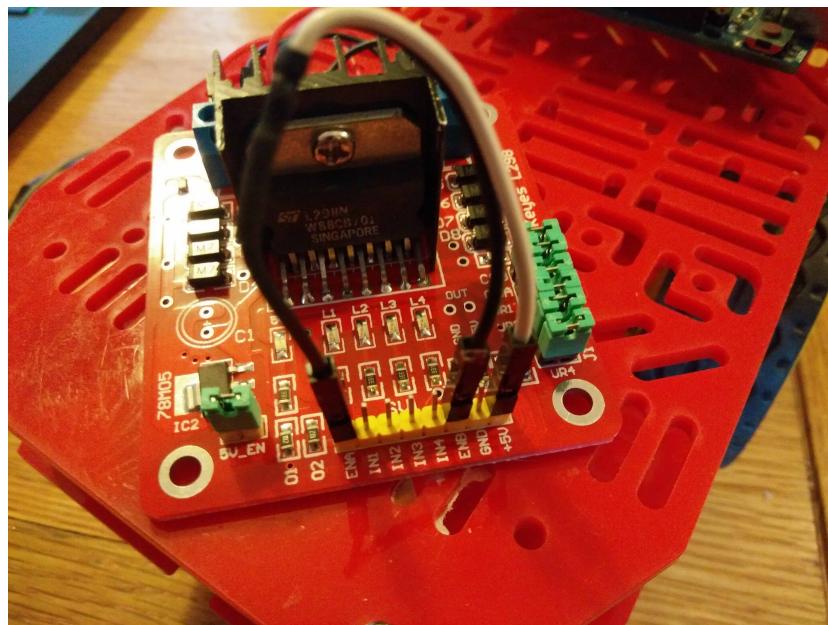
**9. Secure the power block to the chassis.**

This is to prevent the electronics from moving around whilst the robot is driving.



**10. Use a custom jumper cable to connect pins ENA, ENB and +5v on the motor controller.**

These red motor controllers have pins which allow you to turn the power to enable the motors to be used. ENA and ENB. We want these to be connected to 5v as we want to be able to use the motors anytime we want.

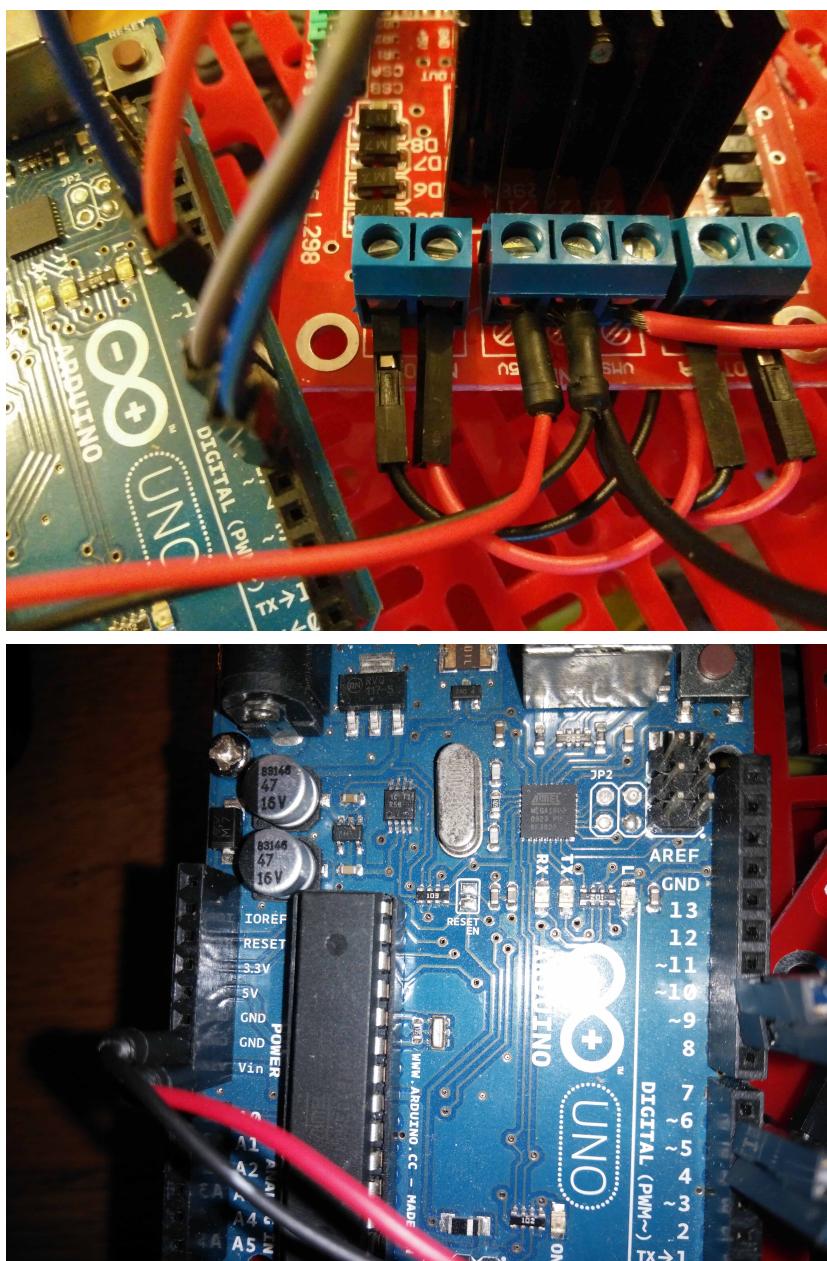


11. Connect a male-to-male jumper cable into the 5V pin on the motor controller and add it to VIN on the Arduino.

We need to send power to the Arduino, we can use the same battery as the motor controller by piggy-backing off the motor controller regulator that turns 7.4 volts to 5 volts.

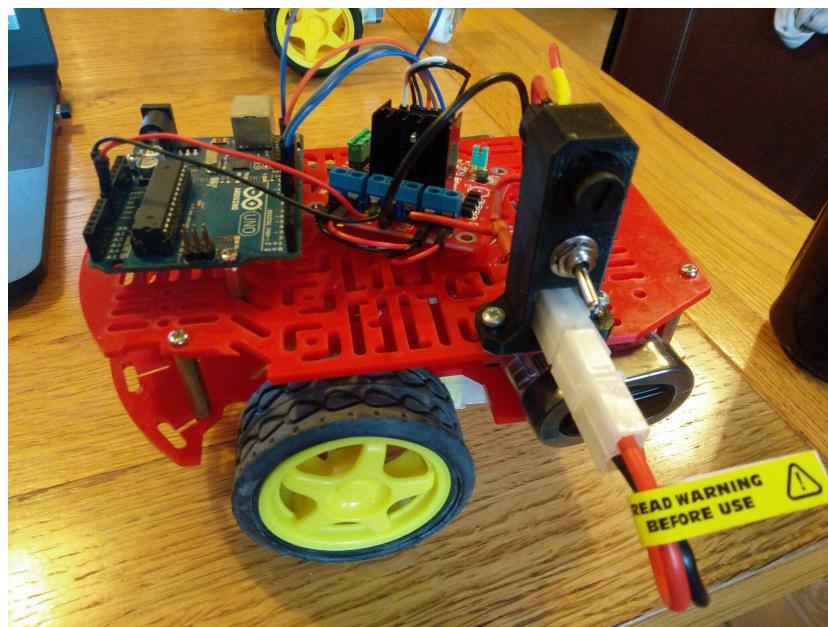
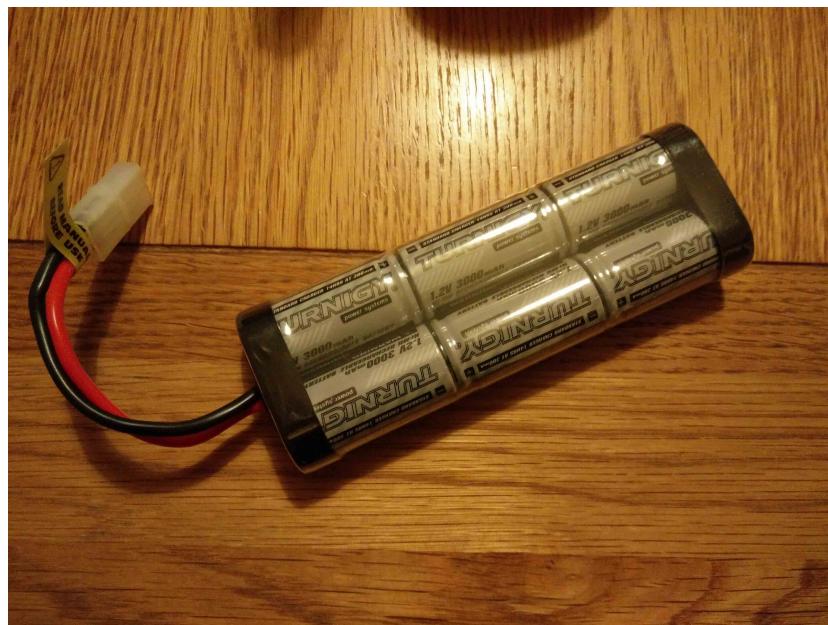
12. Connect a male-to-male jumper cable into the GND pin on the motor controller and add it to GND on the Arduino.

See the picture below to see how to power.



**13. Call a helper to let them know you are finished and need a battery.**

Once you have finished all the previous steps, you are ready to add the battery. A helper will check your circuit to make sure it is safe to add the battery.



You are now ready to move along to the programming worksheet to test your drive systems.