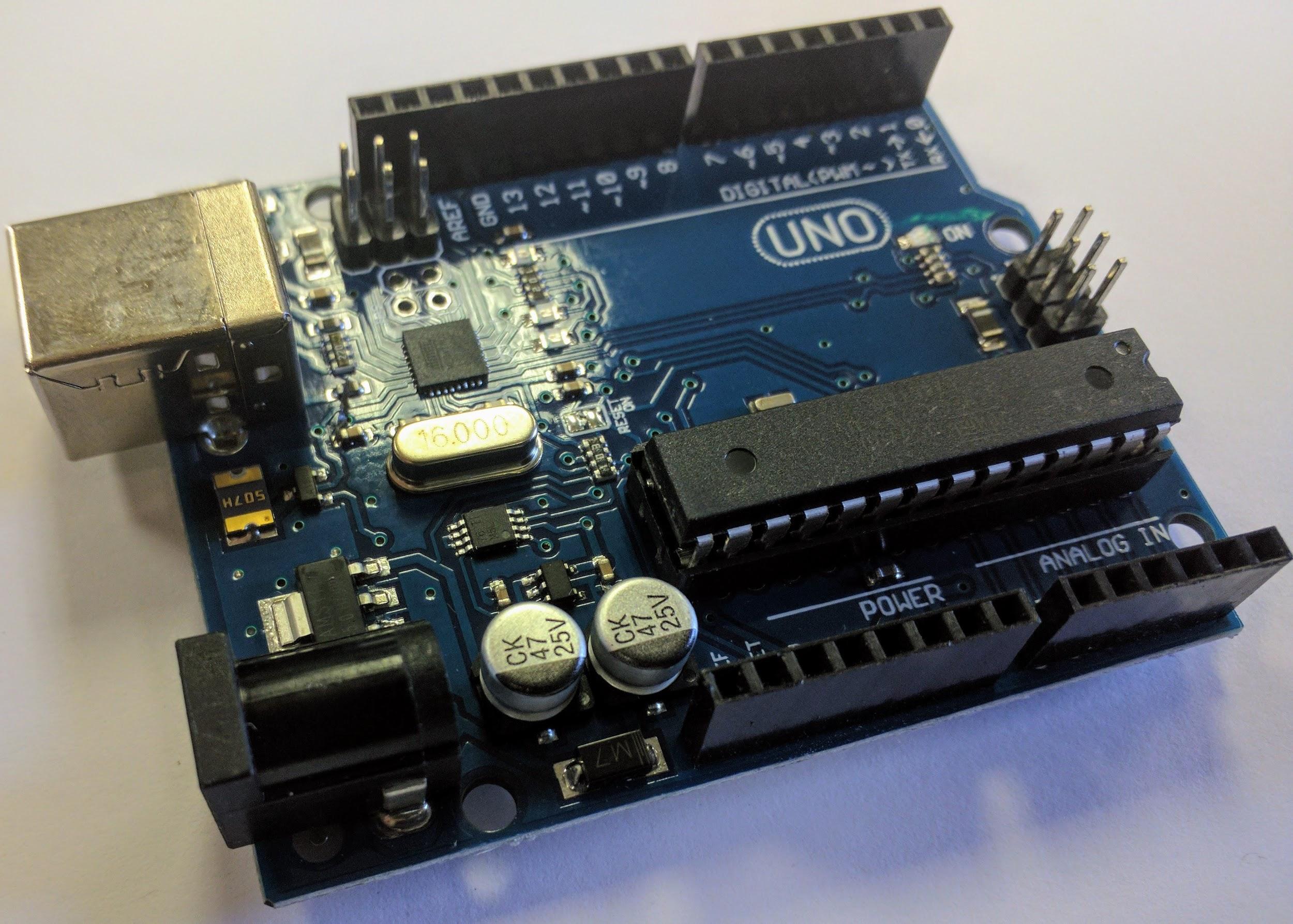
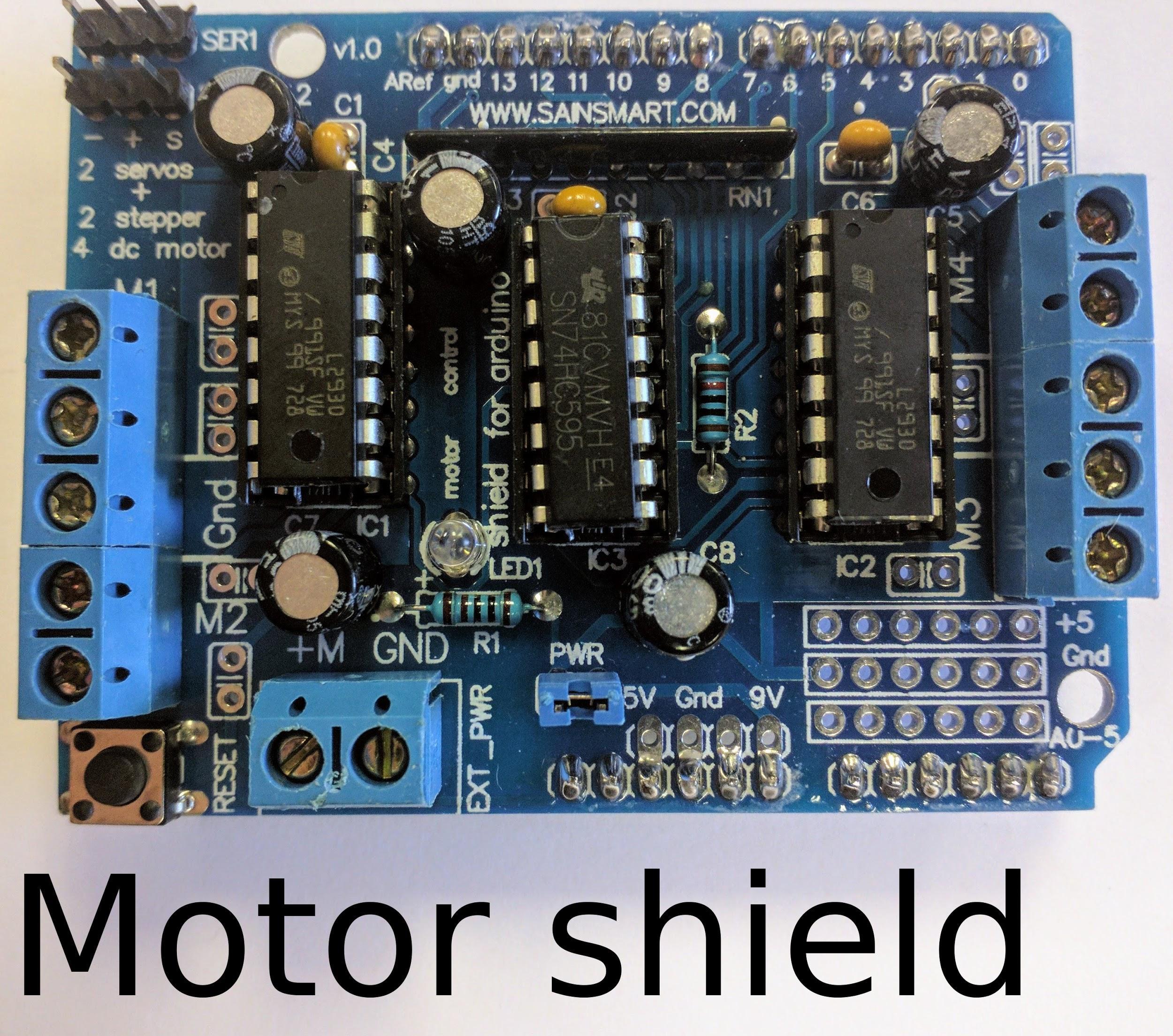
**iCREAT I: Module 6 - LAB 2- Arduino Motor Shield**



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# Objectives

* Learn what a library is and how to install them on the Arduino environment.
* Learn how to perform a manual installation of an Arduino library.
* Learn how to install an Arduino motor shield
* Get familiar with [**Adafruit Motor Shield**](https://www.adafruit.com/product/81) V1.0
* Get familiar with the full documentation for the “[***Adafruit Motor Shield***](https://cdn-learn.adafruit.com/downloads/pdf/adafruit-motor-shield.pdf)”
* Get familiar with the Adafruit motor shield to control a servo, and 2 DC motors

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# Background / Scenario

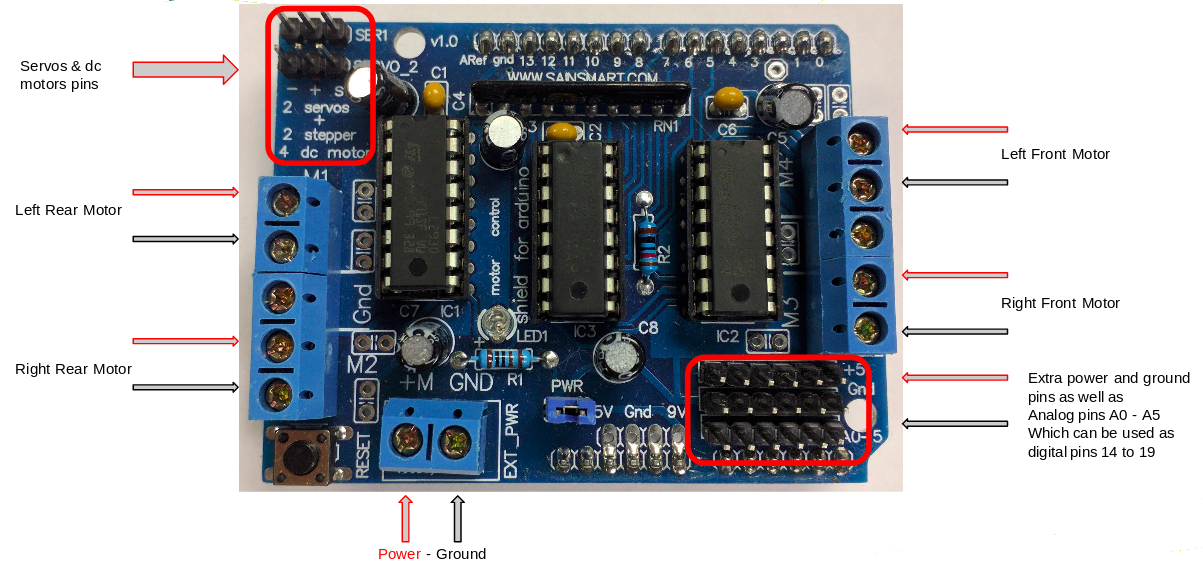
Once you are comfortable with the Arduino software and using the built-in functions, you may want to extend the ability of your Arduino with additional libraries. [Libraries](https://www.arduino.cc/en/Guide/Libraries#toc1) are a collection of code that makes it easy for you to connect to a motors, servos, sensor, display, module, etc. The built-in Arduino libraries and some of these additional libraries are [listed in the reference](https://www.arduino.cc/en/Reference/Libraries). To use the additional libraries, you [will need to install them](https://www.arduino.cc/en/Guide/Libraries#toc2). There are three ways for installing an Arduino library: 1) [Using the Library Manager](https://www.arduino.cc/en/Guide/Libraries#toc3), 2) [Importing a .zip Library](https://www.arduino.cc/en/Guide/Libraries#toc4), or 3) [Manual installation](https://www.arduino.cc/en/Guide/Libraries#toc5).

A **Motor Shield** is a driver module that allows you to easily use a microcontroller to control the working speed and direction of motors. The [**Adafruit Motor Shield**](https://www.adafruit.com/product/81) is a great and quick way to control DC motors, servos or even stepper motors. It has the capability of controlling up to 2 stepper motors, 4 DC motors, and 2 servos. In this lab you will learn and experiment with the [**Adafruit Arduino Motor Shield**](https://www.adafruit.com/product/81) and the [Arduino](https://en.wikipedia.org/wiki/Arduino) [microcontroller](https://en.wikipedia.org/wiki/Microcontroller).

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# Required Resources:

* 1x Arduino UNO board connected to a computer
* 1x Appropriate USB [ca](http://www.robotshop.com/cables-wires-connectors-en.html)b[le](http://www.robotshop.com/cables-wires-connectors-en.html)
* 1x Breadboard
* 1x [Adafruit](https://www.adafruit.com/) [Arduino Motor Shield V1.0](https://www.adafruit.com/product/81)
* 1x car chassis with 2x DC Motors
* 1x Servo Motor
* 1x External power supply (4x1.5v battery pack, or a 1x9v battery pack)
* Jumper wires
* Access to the [Arduino IDE](https://www.arduino.cc/en/Guide/Environment)
* Adafruit Motor Shield Library



**Part 1. Installing the Adafruit Motor Shield Library**

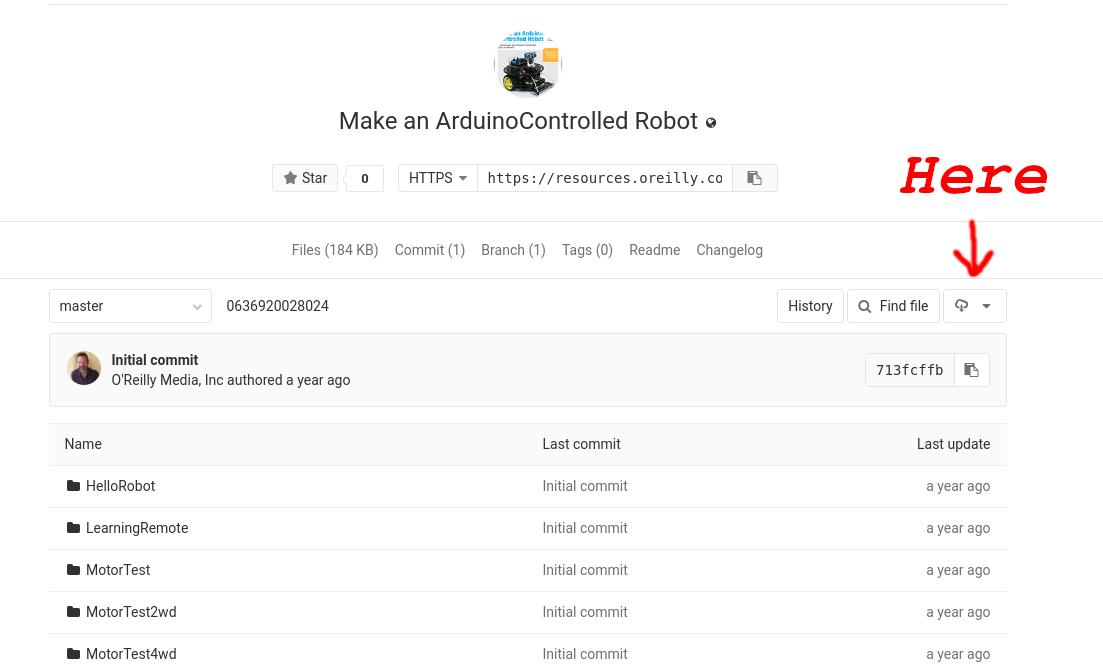
**(This MUST be done on the PC before part 2 )**

In this section you will learn how to [manually install](https://www.arduino.cc/en/Guide/Libraries#toc5) a third-party library on your [Arduino IDE environment](https://www.arduino.cc/en/Guide/Environment). Full documentation for the [Adafruit Motor Shield V.1.0](https://www.adafruit.com/product/81) could be found here: “[***Adafruit Motor Shield***](https://cdn-learn.adafruit.com/downloads/pdf/adafruit-motor-shield.pdf)”. To make life easier for the final project, you may use the book titled: “[***Make an Arduino-Controlled Robot***](http://shop.oreilly.com/product/0636920028024.do)” by [Michael Margolis](https://youtu.be/UubLEOP-C8s) as a reference.

1. To install the library, first quit the [Arduino IDE](https://www.arduino.cc/en/Main/Software).
2. Click on the following URL to have access to all the material and sample code used in the book:

<http://shop.oreilly.com/product/0636920028024.do>

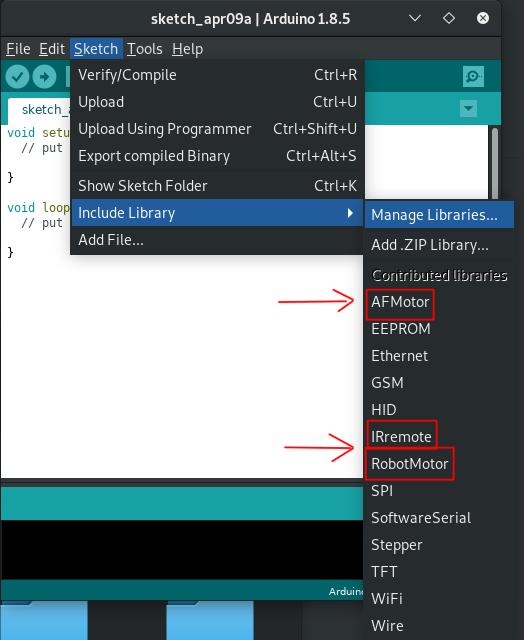
1. Use this direct [link](https://resources.oreilly.com/examples/0636920028024.git) to download the library. On the upper right-hand side **click** on the “**Download** ” icon next to “**Find file**” icone, which will download a ZIP file.

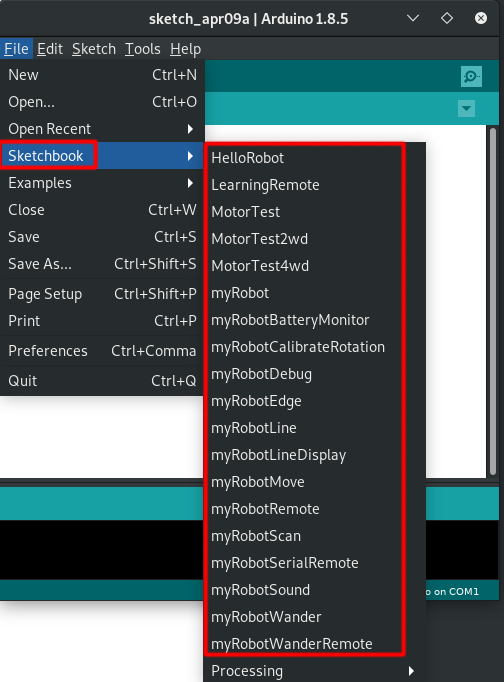


1. On Windows, the **ZIP** file will be downloaded to the “**Downloads**” folder:

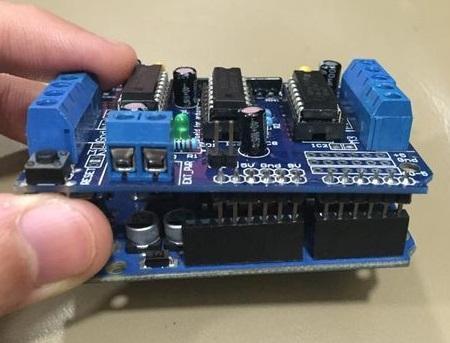
*“****C:\Users\YOUR-USER-NAME\Downloads****”*

1. The downloaded file name should look like “**0636920028024-master.**” Extract the ZIP file.
2. For simplicity’s sake, rename the extracted folder to “***master***”.
3. Copy all the libraries contained in the “**master\libraries**“ folder into your own libraries folder. Under Windows, it will likely be called "***My Documents\Arduino\libraries***". For Mac users, it will likely be called "***Documents/Arduino/libraries***". On Linux, it will be the "***~/Arduino/libraries***" folder.
4. Copy the sample files contained in the “**master**“ folder (***except “master/libraries”***) into your own Arduino folder. Under Windows, it will likely be called "***My Documents\Arduino***". For Mac users, it will likely be called "***Documents/Arduino***". On Linux, it will be in “***~/Arduino***”.
5. Also, in Module-6, “MotorTest-iCREAT” and “MotorTest-2wd-iCREAT” are a modified version of the originals “[MotorTest](https://resources.oreilly.com/examples/0636920028024.git)” and “[MotorTest-2wd](https://resources.oreilly.com/examples/0636920028024.git)”. Add both folders to; on Windows "***My Documents\Arduino***", on MAC "***Documents/Arduino***" and on Linux it will be under “***~/Arduino***”.
6. Restart the Arduino IDE. Make sure the new library appears in the “***Sketch->Include Library”*** menu item of the software. That's it! You've installed a library!

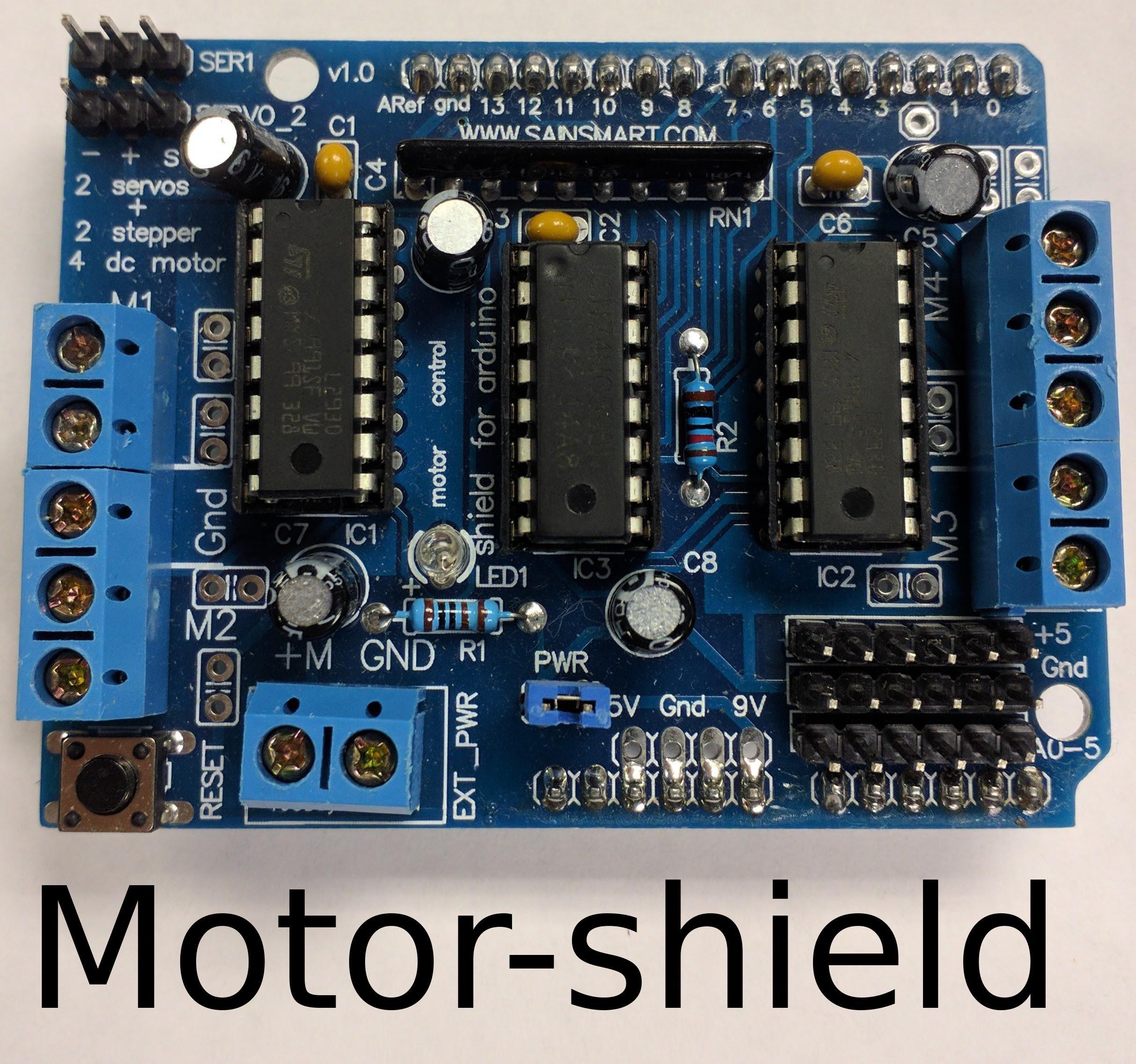
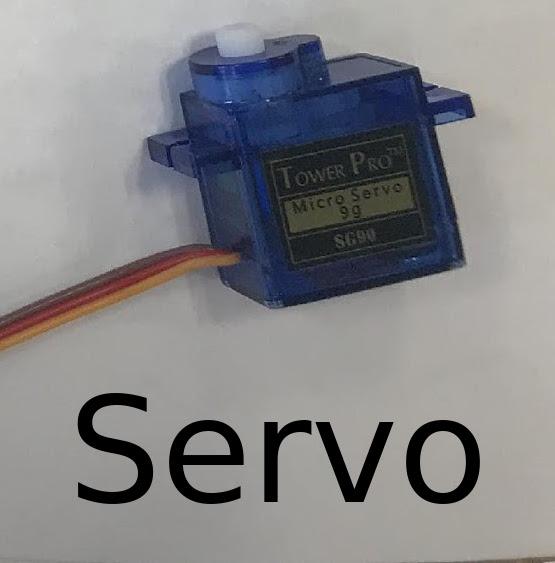


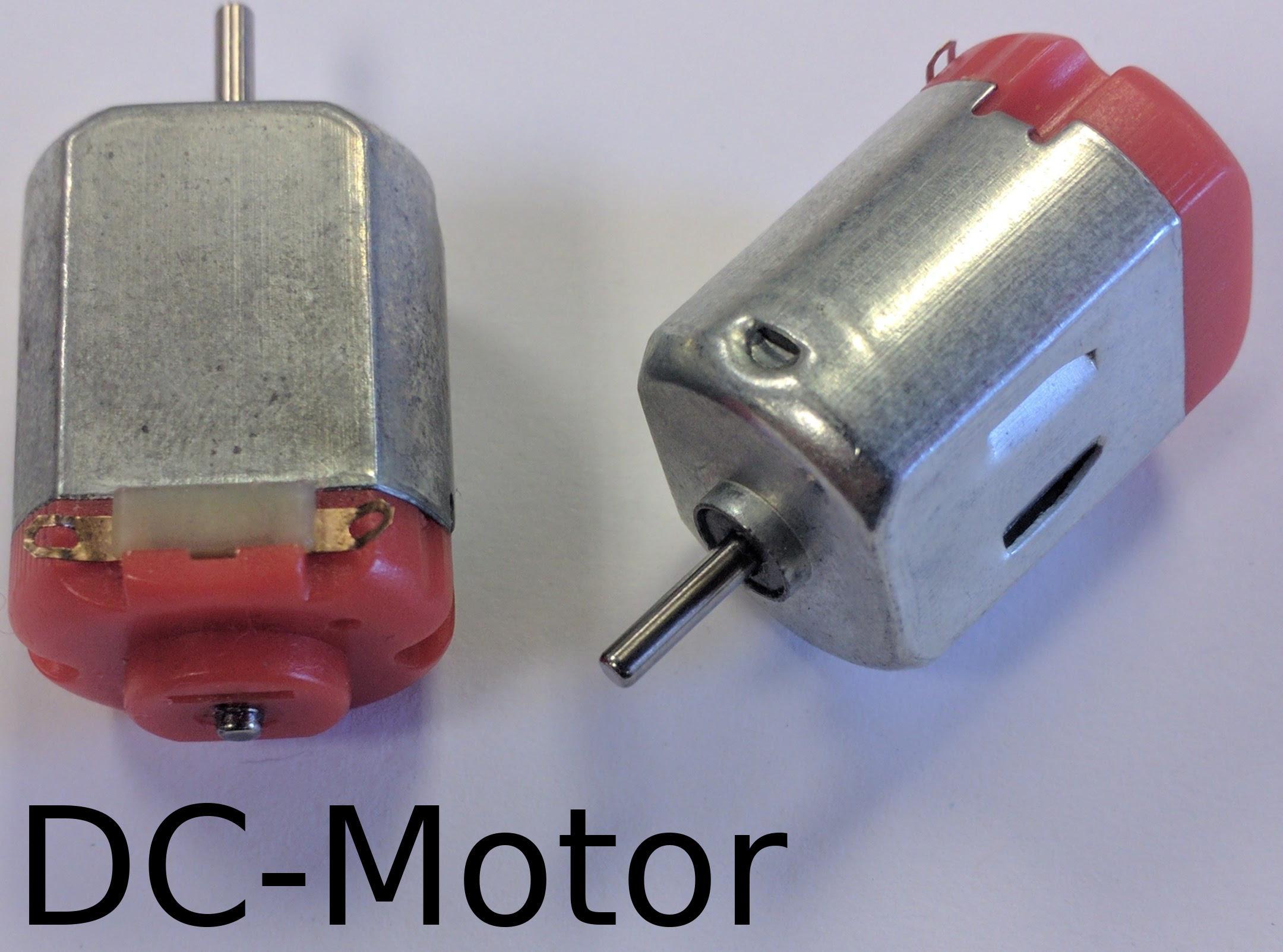


1. **Follow the diagram** to create the circuit (do not forget the Arduino):

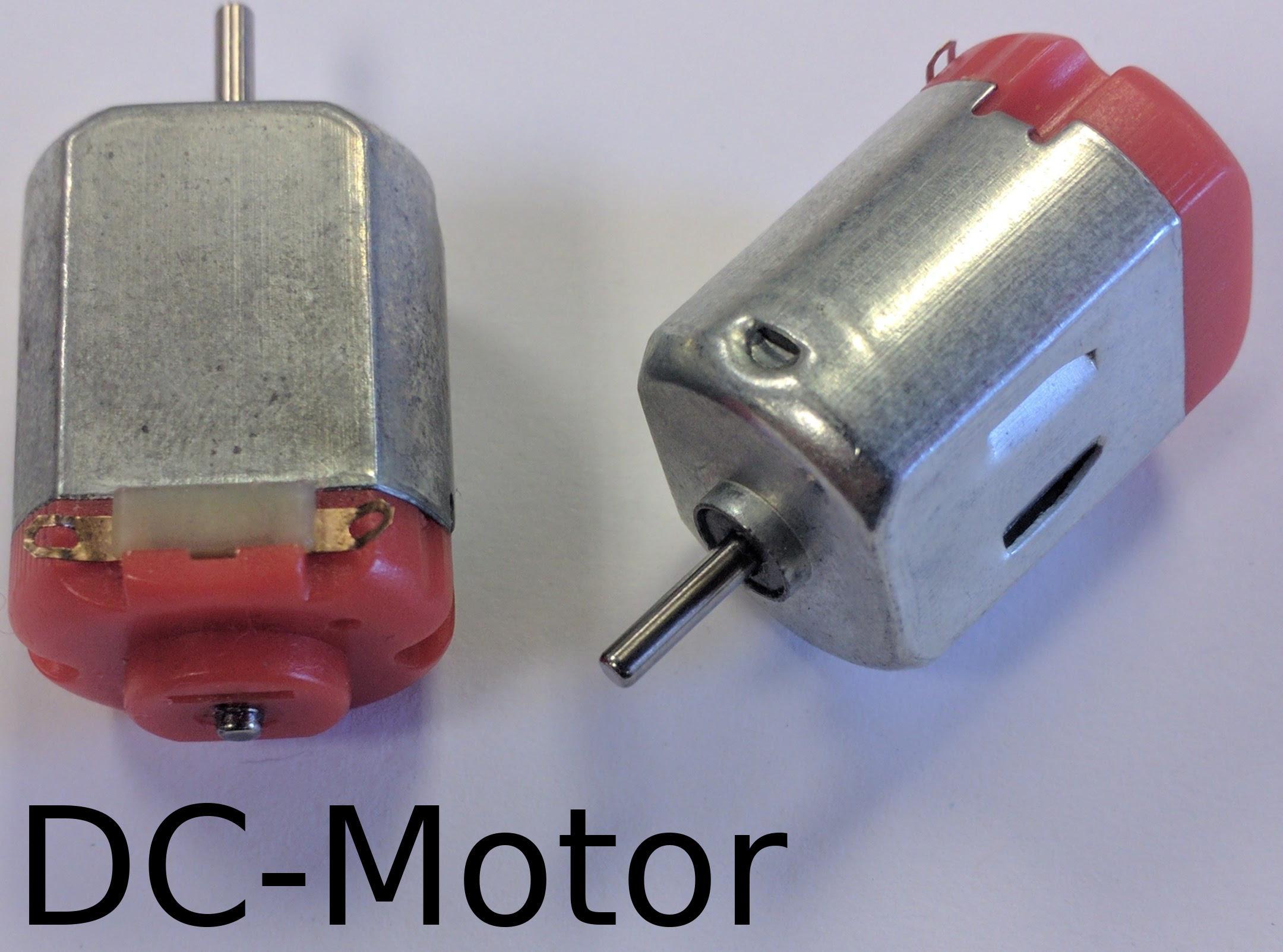


**Part 2. Testing the Adafruit Motor Shield Library**









1. ***In order to complete part-2 you must have the libraries in part-1 on your current machine***.
2. Click on **File-**>**Sketchbook-**>**MoterTest2WD**

In order to do your testing use the car chassis provided. Read and understand the code, and make sure you perform the proper adjustment (motors, servos, output lines, etc).

2. **Have fun and experiment** with your code.

3. **Show your** completed diagrams and working programs before you move to the next section.

* Tutorials, Examples and help at <https://www.arduino.cc/en/Tutorial/BuiltInExamples>
* This tutorial is partially based on the book titled “[***Make an Arduino-Controlled Robot***](http://shop.oreilly.com/product/0636920028024.do)” by [Michael Margolis](https://youtu.be/UubLEOP-C8s) (O’Reilly). Copyright 2013 Michael Margolis, ISBN (978-1-4493-4437-5)