Automated IV Collection in MATLAB

In this document, we will discover how to automate lab measurements, such as collecting the IV data required when characterizing the DC motor of the wheel.
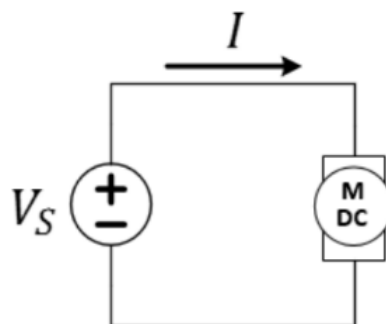

Figure 1: Circuit schematic of the variable voltage source motor-drive method.

- ✓ Connect your circuit as shown in Figure 1 using one of the (geared) yellow motors of your car.
- ✓ Download either ivcollect.m (MATLAB source file) or ivcollect.mexw64 (executable file) from the course webpage. Save it in the *U:* drive.

LAB 7: *MOTORS AND BATTERIES*

Lab Procedures	Modules	Extra Content
Lab 7 Prelab	Module 6D: Using the Arduino to Drive Vehicle	Automated IV Collection in MATLAB - ivcollect.m
Lab 7 Procedures	Module 7A: Characterizing Resitive Sensors	Compiled version - ivcollect.mexw64
	Module 6B: Interfacing Resitive Sensors (Digital)	

Figure 2: Website location of the necessary file(s).

In the following example, we have downloaded ivcollect.mexw64 from the Lab7 section of our website onto the *U:* drive in the folder U:/documents/Lab 7 (you may have to create that directory). Start MATLAB, then use this icon to point the "current directory" of MATLAB to that folder so that it can find your files.
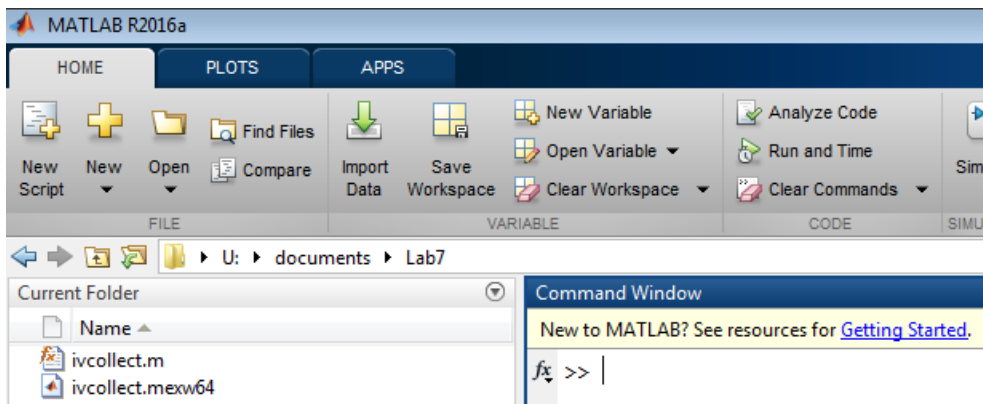
Figure 3: MATLAB environment after pointing to the correct directory

At the MATLAB command prompt, type the following command:
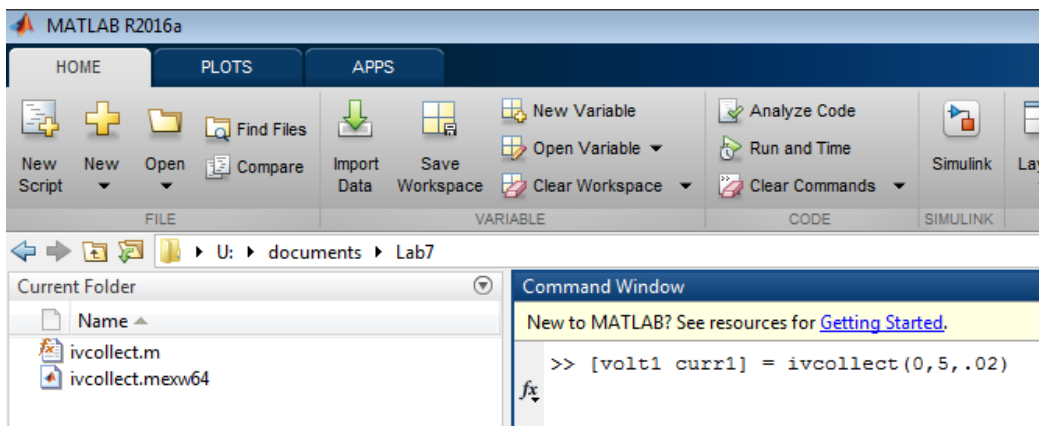
>> [volt1 curr1] = ivcollect(0,5,.02)

Figure 3: Using the MATLAB command line.

Using this command, ivcollect.mexw64 will communicate with the power supply to sweep the voltage from 0V to 5V in 20mV increments. The program will return two arrays called *curr1* and *volt1* that contain the recorded current and the voltage values respectively.

Figure 4: MATLAB will remain "busy" during the execution of the code.

You can reverse the direction of the voltage sweep by typing the following command:

>> [volt2 curr2] = ivcollect(5,0,-.02)

This will sweep from 5V to 0V in 20mV decrements and place the results in two more arrays, *volt2* and *curr2*.
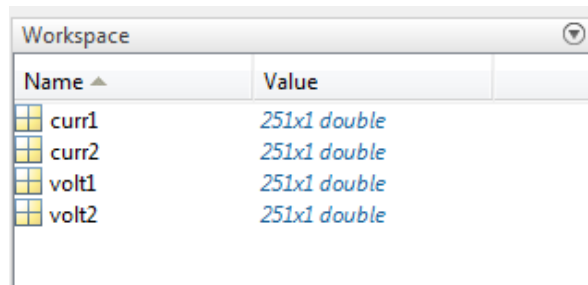

Figure 5: MATLAB arrays and variables are visible in the Workspace..

Finally, you will plot your automated measurements to generate IV curves.

To plot the data, you insert the following commands one by one and you will get your IV curves:

>> plot(volt1, curr1)

>> hold on

>> plot(volt2, curr2)

>> hold off

The rest (linear approximation, etc.) is up to you!