BME 3511 Laboratory 4

Resistors in Parallel

Objective:

The objective of this exercise is to understand how to connect resistors in parallel and also how to use the NI myDAQ to measure resistance and voltage. Upon the completion of this lab, the student will:

- Connect resistors in Parallel.
- Measure individual resistance as well as equivalent resistance.
- Measure voltage across a parallel circuit.

Background:

When resistors are connected in parallel, then they have the following properties:

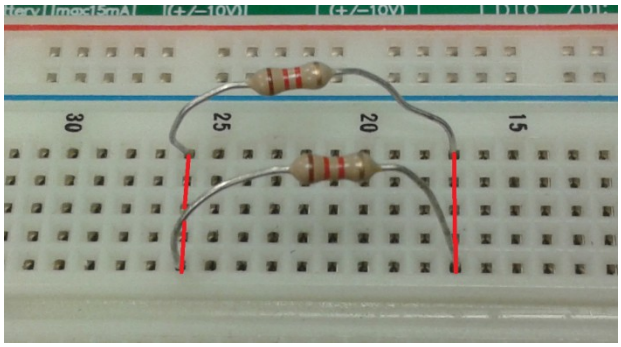
- The voltage at all points of the circuit is equivalent since the potential difference between any two points in the circuit is the same.
- The equivalent resistance of a parallel circuit is obtained by following formula:

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots \ldots$$

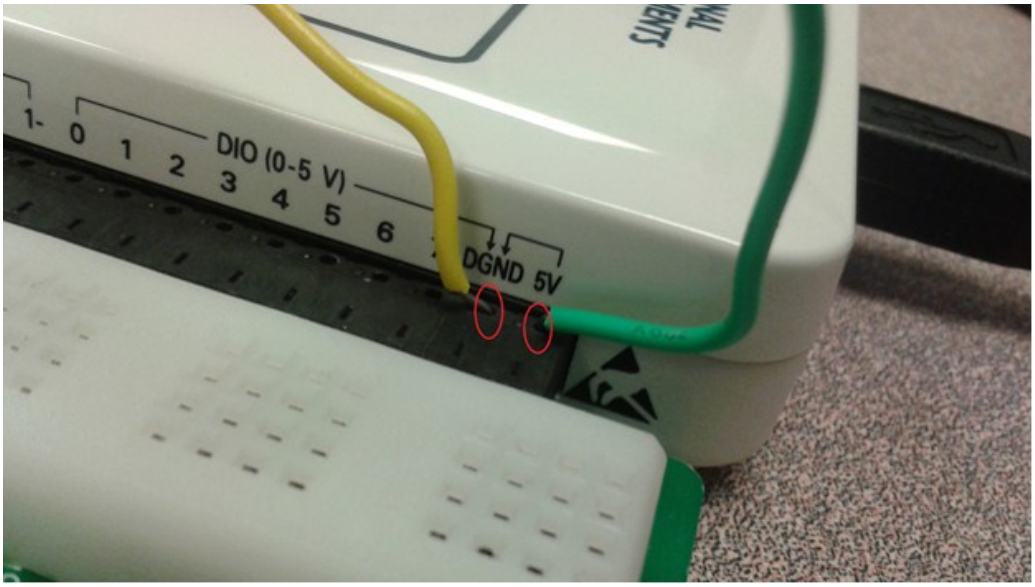
Now we will do an example of how to measure these values using the NI myDAQ.

Lab Procedure:

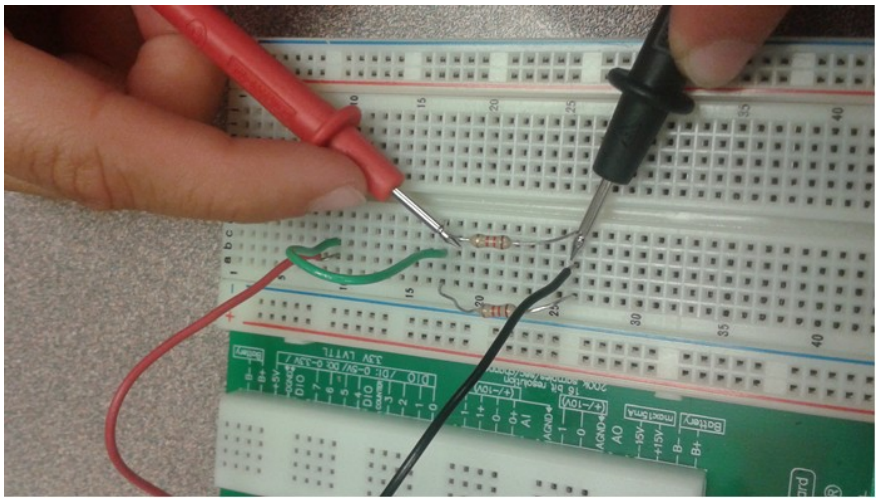
1) First, we will set up the resistors on the breadboard in parallel; notice where each leg of the resistor is placed.



2) Next, we will connect the circuit to the NI myDAQ, which will also serve as a 5 Volt power source.



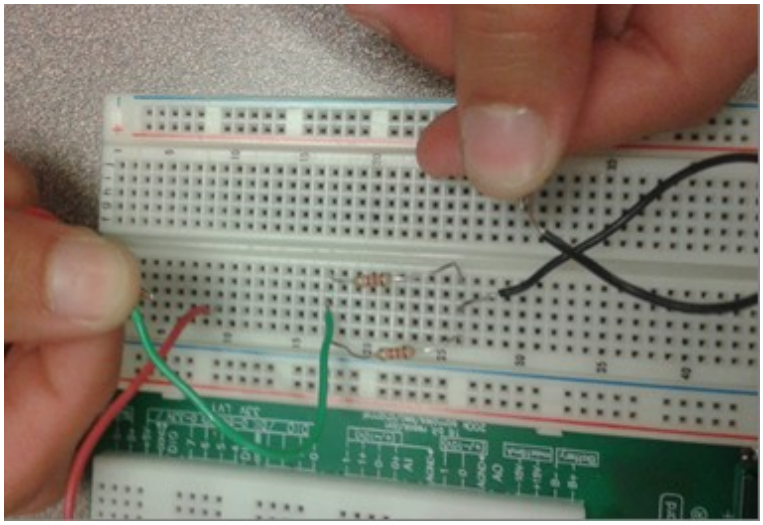
3) Then we will measure the resistance across each of the resistors individually and then measure the total resistance across the resistors in parallel.



NOTE: You must measure the resistance while the voltage source is powered off.

HINT: In order to measure the total resistance use two wire segments, one should be inserted into the bread board in the same row one end of the resistors are located and the other segment should be inserted in the row where the other end of the resistors are located.

4) For the next measurement we will switch the DMM to the voltage setting in order to measure the voltage. Measure the voltage through each individual resistor as well as the overall voltage.



Note: You should perform hand calculations before taking any measurements in order to find an approximate range. Also when measuring the voltage the placement of probes will be the same as it was when measuring resistance.

BME 3511 Laboratory 4 Resistors in Parallel

Student Name: _____ Date Submitted:_____

Lab Partner(s):_____

Lab Procedure: Set up the follow circuits in parallel. Measure the resistances individually as well as the total resistance. Assume voltage source of 5 Volts. Calculate equivalent resistance, current, and voltage across each resistor. *Measure* and *record* the currents as indicated.

Resistors	**Measured Resistance**	**Calculated Voltage**	**Calculated Current**	**Measured Current**
R1 = 1.2 kΩ R2 = 1.2 kΩ	R1 = R2 = RTotal =	V_{R1} = V_{R2} = Total =	I_{R1} = I_{R2} = Total =	I_{R1} = I_{R2} = Total =
R1 = 1.2 kΩ R2 = 560 Ω	R1 = R2 = RTotal =	V_{R1} = V_{R2} = Total =	I_{R1} = I_{R2} = Total =	I_{R1} = I_{R2} = Total =
R1 = 680 Ω R2 = 360 Ω R3 = 1.2 kΩ	R1 = R2 = R3 = RTotal =	V_{R1} = V_{R2} = V_{R3} = Total =	I_{R1} = I_{R2} = I_{R3} = Total =	I_{R1} = I_{R2} = I_{R3} = Total =
R1 = 220 Ω R2 = 470 Ω R3 = 1.2 kΩ	R1 = R2 = R3 = RTotal =	V_{R1} = V_{R2} = V_{R3} = Total =	I_{R1} = I_{R2} = I_{R3} = Total =	I_{R1} = I_{R2} = I_{R3} = Total =
R1 = 680 Ω R2 = 15 kΩ R3 = 560 Ω	R1 = R2 = R3 = RTotal =	V_{R1} = V_{R2} = V_{R3} = Total =	I_{R1} = I_{R2} = I_{R3} = Total =	I_{R1} = I_{R2} = I_{R3} = Total =