Circuits Lab
ENGR 1181
Lab #3
Circuits in the Real World

Many engineering fields and products require the use of circuits. Some are more complicated than others, but all follow the same basic principles. A handful of applications include electric cars, biomedical devices, computers, traffic controls, sensors, electronic displays, and cell phones.
Today's Learning Objectives

- After today's class, students will be able to:
  - Recognize and assemble series and parallel circuits.
  - Construct electric circuits using a breadboard.
  - Demonstrate how voltage, current and resistance are measured.
  - Identify and use Ohm’s Law, Power Law, Kirchhoff’s Current Law and Kirchhoff’s Voltage Law.
  - Calculate and measure the equivalent resistance of electric circuits.
  - Employ the proper circuit configuration for a given scenario.
Digital Multimeter

Connect the red and black probes to their appropriate Digital Multimeter (DMM) connections as shown in the white box:

- Turn the DMM dial to the DCV setting to configure it as a voltmeter.
- This is the standard configuration of leads.
Converting from Schematic to Physical

- Follow the Diagram

Schematic

15 Volts BATTERY

Current, I

R = 5 Ohms

Ground

Physical Layout

+5 Volts

Circuit Schematic
Converting from Schematic to Physical

Different physical circuits can correspond to same logical circuit.

An example of the same circuit in a different physical layout:
Tips for Success

To avoid common problems, make sure that...
1. the power strip is on and plugged in.
2. the circuit is ‘grounded’ & all wires are connected.
3. the LED is placed with proper directionality.
4. all parts of the breadboard are bridged.
5. the circuit is connected to the main 5V power source.
6. all wires and resistors are exactly aligned.
7. calculated values for resistances are used in equations.
8. a resistor is added within the LED circuit.
9. current is always calculated from measured values of voltage and resistance.
Important Takeaways

- Using the principles of Ohm’s and Kirchhoff's circuit laws as well as the applied measurement techniques, you should now be able to calculate and measure resistance and voltage of any electrical circuit.
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