

ME 511 Mechatronics @ UIC

Basics of soldering

This lab is to be done individually, but in the lab.

1 Prelab (not graded)

1.1 Motivation

The goals of this lab are as follows: Basics of Soldering wires and components to a perfboard.

1.2 Assigned Reading

This part of the Lab needs to be done before you come to the lab. Assigned reading from the textbook is listed below

1. Preparing the soldering iron/tip <https://youtu.be/yTcxn773G-4>. Then soldering two wires together: <https://youtu.be/BLfXXRfRlzY>
2. A quick graphic that shows how to solder and how to judge if soldering is done correctly https://cerebro.readthedocs.io/en/1.0/_images/soldering101.png. Here are actual images of good/bad soldering jobs:
https://cdn-learn.adafruit.com/assets/assets/000/001/978/original/tools_Header_Joints.jpg?1396777967
(use this while soldering for a quick refresher).
3. Soldering components on perfboard. YouTube link: <https://youtu.be/l9Kbr8cPqOE>
4. How to choose resistor in a Light Emitting Diode circuit <https://eepower.com/resistor-guide/resistor-applications/resistor-for-led/>.
5. A guide on how to choose soldering tools (for future reference) <https://learn.adafruit.com/adafruit-guide-excellent-soldering>.

1.3 Questions based on reading

The teaching assistant/instructor may ask you any question related to the pre-lab material. Be prepared to answer these. Example question.

1. Which of the following is a BAD soldering practice.
 - (a) Touching the soldering tip to the item to be soldered.
 - (b) Touching the soldering tip to the solder to melt the solder.
 - (c) Tinning the soldering tip before you begin soldering.
 - (d) Ensuring a strong mechanical connection between the two wires before soldering.

Answers 1 b

2 Labwork (graded)

NOTE: There is no lab report. You have to do all the experiments in the lab and show your work to the TA as written below to get credit for the lab. At the end of the lab, ask the teaching assistant to perform a peer review, else nobody from your group will get credit for the lab. Scoring as shown. There is a 20 point penalty for taking more than 1hr 50 min for the lab.

Equipment list

1. Soldering supplies: Soldering Tool, Helping Hand, Solder, and Wire Stripper, Wires.
2. 1 perf board
3. 1 LED
4. 1 resistor
5. 2 pin male header or barrel jack (this will depend on the type of connector used on the 9 V battery).
6. 9V battery connector
7. 9V battery

2.1 (30 points) Soldering two wires together

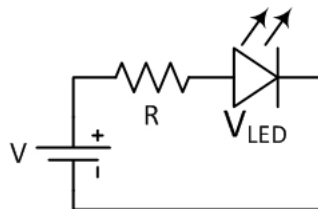
Preparing the soldering tip. Watch this video: <https://youtu.be/yTcxn773G-4>. This video shows how to solder the wires together <https://youtu.be/BLfXXRfRlZy>.

A quick graphic that shows how to solder and how to judge if soldering is done correctly https://cerebro.readthedocs.io/en/1.0/_images/soldering101.png.

Each person in the group should do this exercise and show it to the teaching assistant.

2.2 (30 points) Choosing components for the circuit

You will build the following circuit. The purpose of the resistor is to prevent excessive current to flow in the circuit which would blow the LED.



Assume a battery voltage of 9 V. Look at the specification sheet of the LED. Complete the following

$V_{LED} = \text{-----}$ (V); (forward voltage)

$I_{LED} = \text{-----}$ (A); (maximum current)

Based on these values, compute the minimum resistance needed.

$R = \text{-----}; \Omega$

Now build the circuit using a breadboard to ensure that the LED does not blow out but has enough current to light up.

2.3 (40 points) Soldering components to a perf board

Now build the perf board to assemble the LED-resistor circuit and show that it works when the battery is connected. This video shows how to solder on the perf board. <https://youtu.be/19Kbr8cPqOE>. Each person in the group should do this exercise and show it to the teaching assistant. The perf board was already provided to each of you.