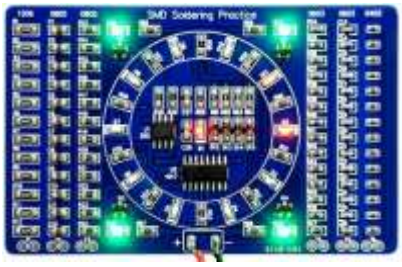
University of Pittsburgh
Department of Electrical and Computer Engineering
ECE 1895: Junior Design Fundamentals
Dr. Samuel Dickerson

Assignment 7: Soldering Practice

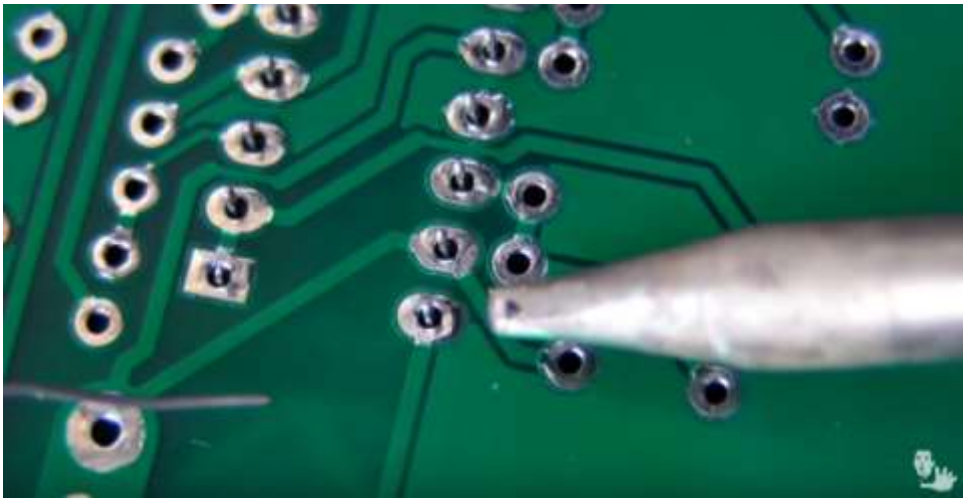
In this assignment, you will practice soldering by soldering one of the two following practice kits.



- **While you are encouraged to try both kits, you are only required to assemble one of the two kit options.**
- **Every student has been given a through-hole practice kit. If you would like to attempt the assembly of a surface mount kit, you can request one from your instructor**

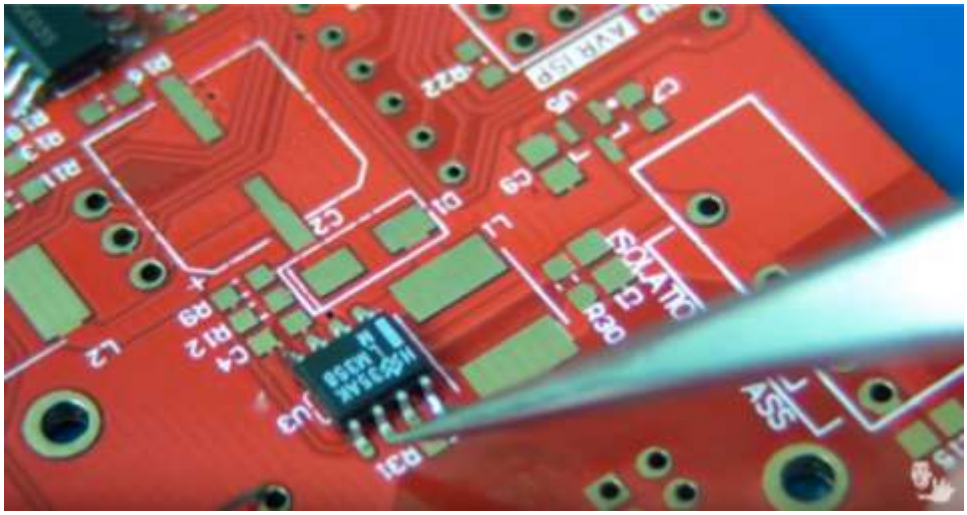
- **If you need a refresher or reference on soldering basics, please refer to the videos below. If you are comfortable with your knowledge of these tools and through hole soldering, you can skip these videos**

Basic Soldering Tools https://www.youtube.com/watch?v=J5Sb21qbpEQ



Through-hole soldering https://www.youtube.com/watch?v=fYz5nIHH0iY

- **The following videos contain information on surface mount soldering. If you made use of surface mount devices (SMD) in your design, then you will need some additional soldering instruction. To learn how to solder surface mount components, please watch the following video:**



Surface Mount Device (SMD) Soldering https://www.youtube.com/watch?v=b9FC9fAlfQE

It would be beneficial to watch as much as the above video as you can, it contains lots of helpful tips. For your reference, here are direct links to the soldering of specific packages that you may have used in your design:

Surface mount resistor/capacitor (0603)@ https://youtu.be/b9FC9fAlfQE?t=248

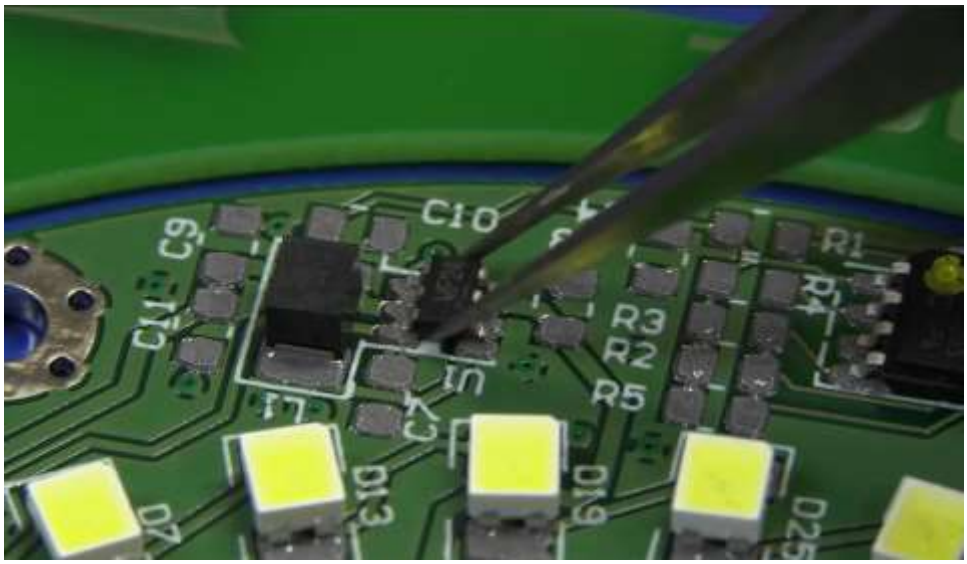
Small Outline Integrated Circuit (SOIC) @ https://youtu.be/b9FC9fAlfQE?t=550

Thin Small Outline Package **(TSOP)** @ **https://youtu.be/b9FC9fAIfQE?t=837**

Quad Flat Package (QFP) @ https://youtu.be/b9FC9fAIfQE?t=1156

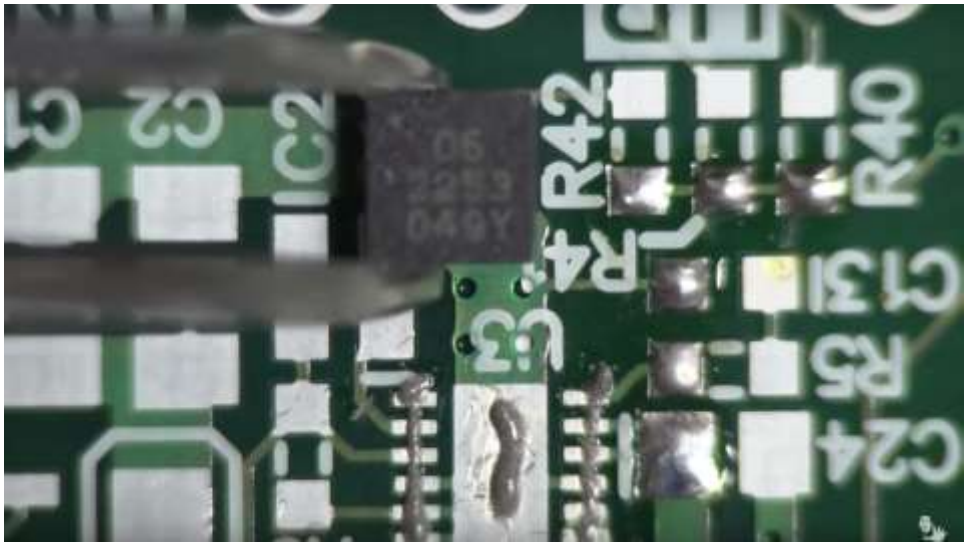
Decwatt package (TO-252 or DPAK)@ https://youtu.be/b9FC9fAIfQE?t=1850

You may have used components that are so small that doing them by hand with an iron is difficult. If that is the case, you made need to use solder paste. Techniques that make use of solder paste are known as reflow soldering. This first video makes use of a SMD stencil. While you don't have a stencil for this design, watching this video will help you understand how solder paste is used.



Using Solder Paste with a Stencil https://www.youtube.com/watch?v=qyDRHI4YeMI

The following video is an example showing the soldering of SMD devices (QFN and MLF packages) using paste and without a stencil. If you feel you need to use paste to assemble your design, please seek out additional training and guidance from the Student Electronic Resource Center (SERC)



Using Soldering Paste without a Stencil https://www.youtube.com/watch?v=M_rO6oPVsws

- **Regardless of the soldering method you use, If you make a soldering mistake don't worry, it's correctable. Here is a brief video on how to remove a soldering joint (desoldering). If you need to de-solder an item, you will need to make use of either desoldering wick or a desoldering pump**

Desoldering Pump

Desoldering Wick

Desoldering Techniques https://www.youtube.com/watch?v=N_dvf45hN6Y

Read the statement below

Above all, when using a soldering iron, PLEASE WORK SAFELY AND RESPONSIBLY. Carelessness could lead to permanent injury for you or someone else. Use eye protection. Be aware of who is around you. Use a fume extractor. Turn the iron off when you are finished.

Fume Extractor **Safety Glasses** **Safe Soldering Practices**

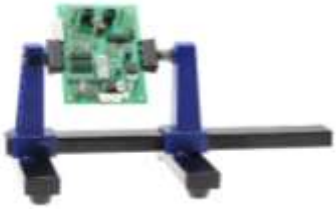
If you do not know where to find any safety or other soldering related items, PLEASE ASK the Instructor, TAs or visit SERC

http://www.riccardobevilacqua.com/SolderingSafety.pdf

Additional Reminders

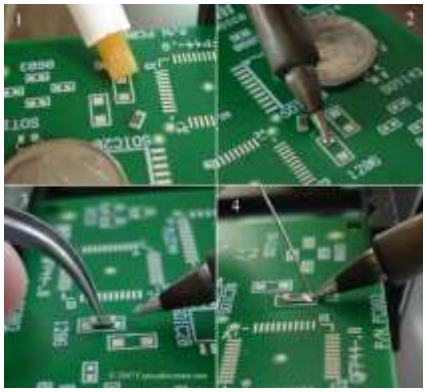
- **You may be able to place and solder all your components just using your bare eyes. If not, feel free to make use of the microscope in the lab and/or the digital document camera that projects on to the television. You may want to use 'helping hands' or a board holder to hold the PCB in place while you work on it.**



Document Camera **Microscope** **Helping Hands** **Board Holder**

- **When soldering surface mount components, you will want to use the 'tack and reflow' method. You need to first solder one joint that will hold the device in place, and then to hold the component in place. Flux is very important for surface mount soldering.**



Tack and reflow method for surface mount soldering

- **<u>Flux</u> is a chemical agent that improves adhesion between solder and metal. There are bottles of flux in the lab ready for you to use. In some instances, it maybe helpful to apply the flux using a Q-Tip (also available in the lab). After you are finished soldering all components, clean your board using Flux remover**

Solder Flux **Board Cleaner (Flux Remover)**

File Submission

- **For this assignment, upload a PDF document with photos of your completed soldering kit (surface mount. through hole, or both).**

- **You may complete both kits for extra credit (100% extra credit)**