# Project 3: Form and Fit for Electronics
# ENGR 11A – Fall 2024

**Assigned:** Tuesday, September 17
**Due:** Tuesday, October 1, 9:35am

## 1 Project goals

- Design on spec for **function** and **fit** for an electronics prototype.
- Work in pairs to build your soldering kits, then measure them to design and 3D print an enclosure. Once that is done, make a second enclosure using laser cutting.
- Make sure the enclosure allows access to four key features: to **see** the lights, to **hear** the alarm, to **control** the alarm clock, and to **access** or change the power.
- Allow time for **at least** two iterations of each design (3D print and laser cut) to get the fit right.

## 2 Guidelines

### 2.1 Creating your alarm clocks

1. Pick someone you haven't worked with before to pair up with. **You will each write your own reflections on your own websites to submit this project.**
2. Solder the electronics kit together in class. You will each make one electronics kit, but may want to collaborate on both builds to learn how they work. Include photos of this process and a reflection on the soldering process in your write-up.
3. Individually take measurements of the electronics kit using digital calipers. Record these measurements in lab notes to include in your write-up.

### 2.2 3D printed enclosure

4. Work together to build a schematic of a design plan for an enclosure using 3D printing. Compare your measurements of the alarm clock and brainstorm and draw a plan for a design for an enclosure on paper or a whiteboard. Take a picture of your drawing to include in your write-up.
5. Create a collaborative project space in Autodesk Fusion that you can both work on. Make a plan for how to divide the work of drawing your design in CAD.
6. Export an STL from Fusion and use Prusa Slicer to prepare it for 3D printing. Record your slicer settings and a screenshot and brief analysis of your 3D print trajectory preview in your write-up. Calibrate a 3D printer and run your 3D print.
7. See if the electronics kit fits on the first iteration—take a picture and write an analysis of the result—you will most likely have to adjust your design for tolerances to get a good fit. Allow time for *at least* two iterations (maybe more!)—adjust and iterate on your design.

### 2.3 Laser cut enclosure

8. After doing the above steps for 3D printing, complete steps 4–7 again but for laser cutting with your partner.
9. Submit a reflection of the process and outcomes **on your personal website.**
10. To submit your assignment, share a link to you personal website reflection on the Slack #homework channel.

## 3 Resources

- How to solder: A beginner's guide: https://www.makerspaces.com/how-to-solder/
- How to solder tutorial: https://www.youtube.com/watch?v=kTURB6QboNY
- Adafruit guide to excellent soldering: https://learn.adafruit.com/adafruit-guide-excellent-soldering
- How to setup a collaborative project space in Fusion 360: https://www.autodesk.com/products/fusion-360/blog/how-to-set-up-collaborative-project-fusion-360/
- How to design a box in Fusion 360 for Beginners!: https://www.youtube.com/watch?v=HDJ2g19SlCI
- Fusion 360 for beginners - Model a box & lid with screws - In-context design - Lesson 9: https://www.youtube.com/watch?v=4_N2--_FUTk
  This tutorial series is **amazing** btw!
- Finger Joint Box for Laser Cutting Fusion 360 Tutorial: https://www.youtube.com/watch?v=ZrcqauNvt0M
- Parametric Open Box With Finger Joints in Fusion360: https://www.instructables.com/Parametric-Open-Box-With-Finger-Joints-in-Fusion36/

## 4 Grading

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| Adherence to guidelines | 30% |
| Class participation | 20% |
| Write-up quality | 30% |
| Fit, function & aesthetics | 20% |