

Project 4: Open-source assistive technology

ENGR 11A – Fall 2024

Assigned: Tuesday, October 8

Due: Friday, October 25, 9:35am

1 Project goals

- Work in pairs, with someone you haven't worked with before, to 3D Print a 150% scale e-NABLE prosthesis. You will each submit your own reflection for the one device built.
- Learn to navigate e-NABLE hub resources and the NIH 3D Print Exchange.
- Write a reflection on the steps of the assembly process, paying particular attention to documenting any difficulties in the process and suggesting how to improve the existing documentation and organization of web resources.

2 Guidelines

2.1 Review documentation

1. Register on the e-NABLE hub and review the resources there for the Phoenix Hand V3 (<https://hub.e-nable.org/p/devices?p=e-NABLE+Phoenix+Hand+v3>).
2. Search for the same hand on the NIH 3D Print Exchange (<https://3d.nih.gov/collections/prosthetics>) and review the linked materials there.
3. You may also want to search other 3D model repositories across the internet and around the e-NABLE hub for resources.
4. Watch at least one video of the assembly process and review at least one written assembly manual.
5. Compare & contrast the different types of documentation provided in your reflection. Could they design a better process to find the files and document the build steps? What worked well for you and what was confusing? Is there anything you would change? Can you document aspects of the process better?

2.2 Print & assemble the model

6. Select this or a similar model to 3D print and assemble.
7. 3D print the necessary public files in PLA material to make an e-NABLE prosthesis at 150% scale to learn the open source hardware platform and design logic of how the hand works.
8. Use the Prusa Mini+ 3D Printers with Prusa Slicer. You only have to have one functional device at the end, but it may take up to two full days of 3D print time, so plan accordingly and break up the work across multiple machines and multiple days this week.
9. Using the supplied parts kit from 3D Universe, assemble the device. Document your process and all 3D printer settings with screenshots and photos. Write a reflection on your website.

2.3 Extend, critique & reflect

10. As part of your reflection, pick a particular activity and sketch a modification to e-NABLE hand, illustrating how the changes would allow for the new functionality.
11. After drawing it on paper, draw it in CAD. This only needs to be a CAD concept (you don't have to fabricate it) but should be thought out.
12. Think about this project in the context of the ethics of design we have been discussing in class. Please write a thoughtful reflection about the project, the e-NABLE organization, the hand, the role of rapid prototyping in prosthesis development, and/or anything else you wish. You should reference and cite at least one of the readings we have done for class (e.g., IDEO, Norman, Hendren, Microsoft Inclusive Design Toolkit) in this reflection.
13. Submit the assignment as a thoroughly documented reflection on your website.

3 Resources

- NIH 3D Print Exchange: <https://3d.nih.gov/collections/prosthetics>
- e-NABLE hub - Recommended Devices: <https://hub.e-nable.org/p/devices>
- The kit we are using for parts: <https://shop3duniverse.com/products/phoenix-hand-by-e-nable-assembly-materials-kit#v32622587858>

4 Grading

Adherence to guidelines	30%
Class participation	20%
Write-up quality	30%
Functionality of the device	20%