

Open Aid

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Introduction

- Our team reached out to a local community partner named Finn to assist in helping him do day-to-day tasks as someone with low hand mobility.
- We were tasked with creating a user friendly device to help Finn open common cardboard packages he receives often.
- Our team designed and prototyped different designs until settling on a hand-held assistive box cutter made from a plastic filament.



Community Partnership

Finn is a fellow student at the University of Illinois Urbana-Champaign who often receives packages from his home.

These boxes contain necessary items for him he uses daily, for example medication. Finn has low mobility in his hands and also uses a powerchair with a tray attached to the front.

Another organization modified some scissors to create an initial device to help Finn open packages on his own, but it did not allow for high mobility and precision.

Finn wanted a device he could control with more ease and possibly even grab onto with his right hand, which has more dexterity than his left.

Design Process

1. Meeting with our client to better understand their disability and the problem they face to come up with a solution
2. Brainstorming potential ideas and reviewing components of each with the client to establish the most ergonomic design
3. Obtain clients arm measurements and Fusion 360 CAD prototyping of the chosen design
4. 3D print designs and repeated client testing and feedback
5. Design redesigns and reprinting
6. Final prototype

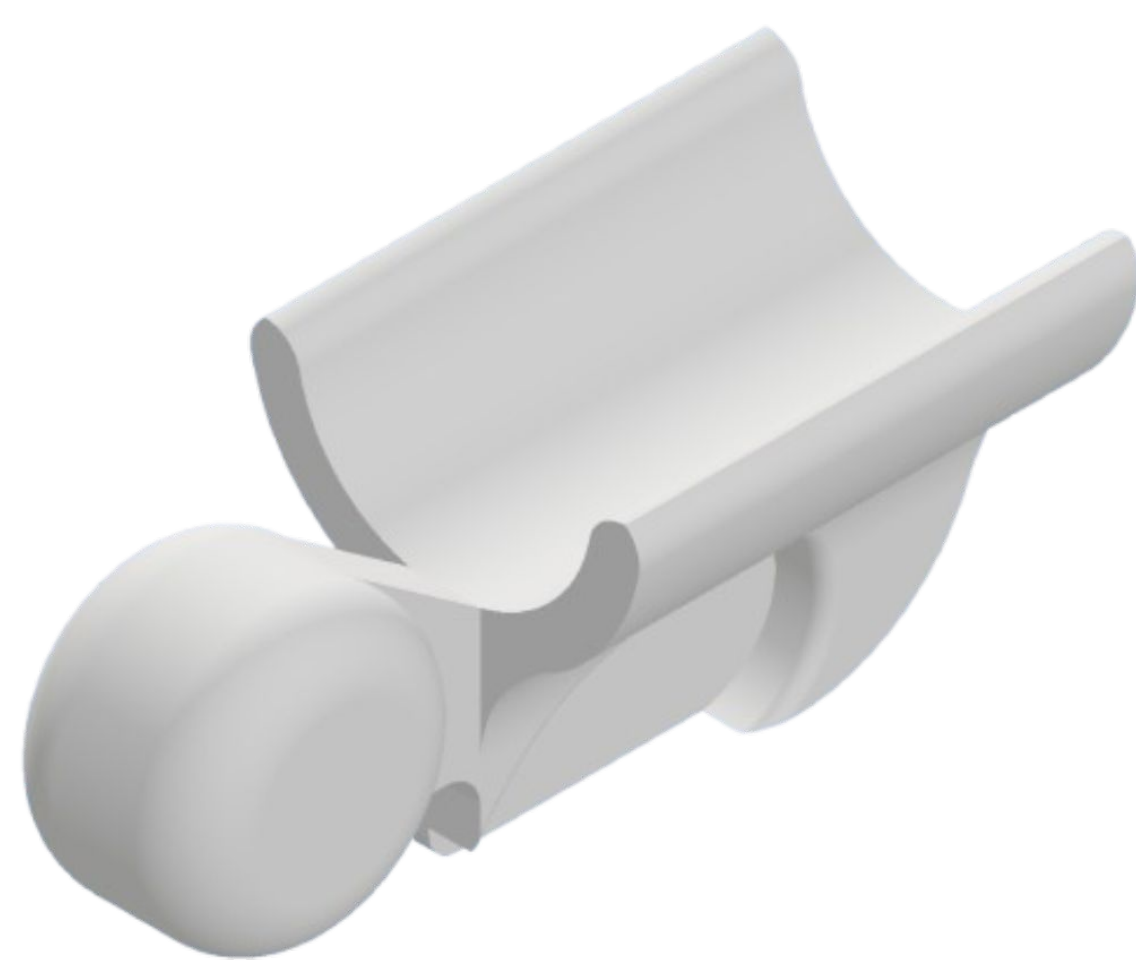


Fig. 1 Fusion 360 Isometric view of initial design concept inclurist rest andding w bulb end piece for stability when pulling across corrugate box.



Fig.2 Side profile of PLA 3D printed devices with integrated blade attached under the wrist rest

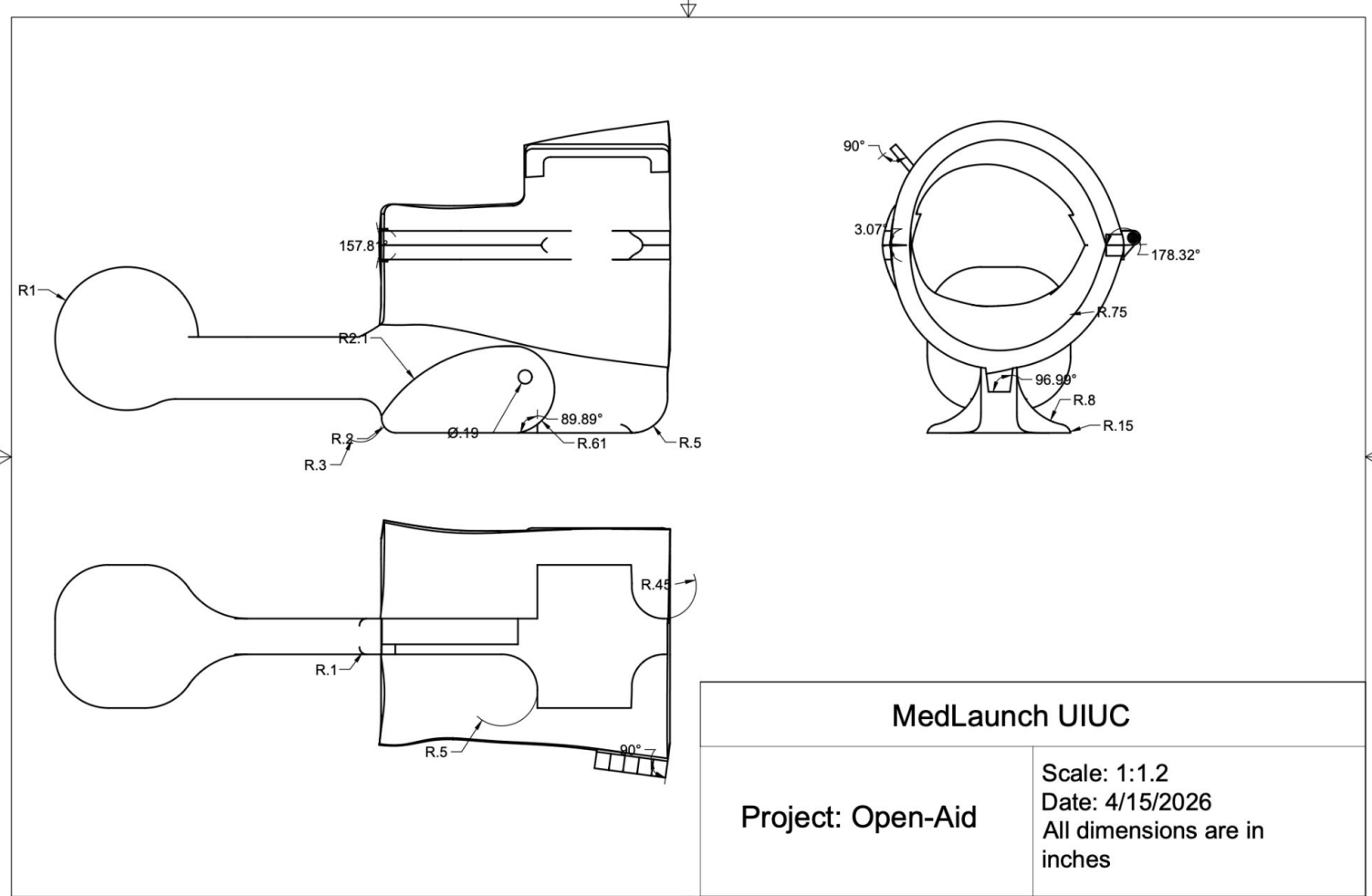


Fig.3 Engineering drawing of wrist brace with added handle and magnetic claps

Final Product

Our Device: Custom fitted orthotic that can be used to help open packages, bags, and snacks easily.

The device is made up of PLA Plastic used from a 3D printer. Magnets lock the device into place around the forearm. The shape of the device was designed specifically with Finn's wrist and forearm measurements to ensure a good fit.

The blade is made of a ceramic material, making it user-safe. It is lodged into a fitted indent at the bottom of the device and is easily replaceable with different blade sizes.

The device also has a protruding handle that Finn can push up to open it with little coordination. This feature helps Finn to independently put on and take off the device with ease.



Conclusions and Future Implications

Project Conclusions

- Finn was able to independently put on and cut packages with the device
- The device's form is tailored to fit Finn's arm and aid in the cutting process
- The device also considers Finn's safety using a ceramic blade that can't cut skin

Future Explorations and Extensions

- Further improvements can be made to the final design such as creating more detailed molds using 3D scanning, optimizing comfort and usability
- Could be mass produced and targetted at the elderly to make opening boxes more controlled and safer by taking away the need for an exposed blade
- We could use the mold for the forearm to attach other tools or objects in order to assist in other tasks for those with low hand mobility

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