

ADR Prototype Progress

Group Designation: G4

Team Members: Saketh Jonnalagadda, Tom Khuu, Alex Nedelescu

Prototype #1: 3/29/19

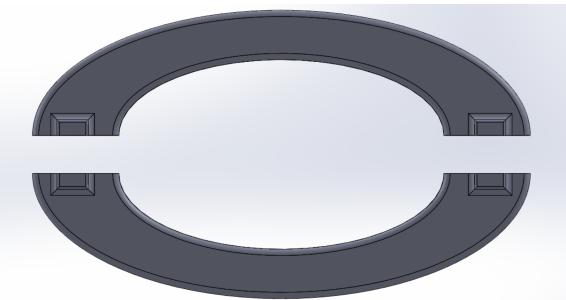


Figure 1a: Front view

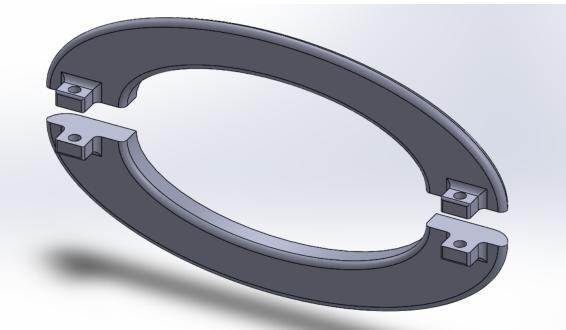


Figure 1b: Trimetric view

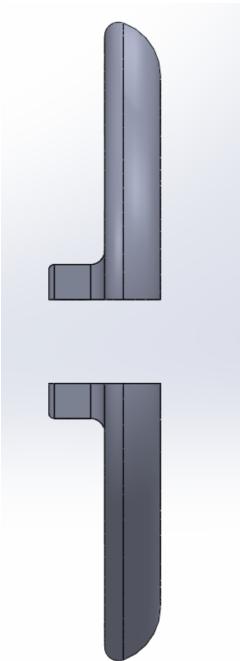


Figure 1c: Side view

Table 1: Pros and Cons of Prototype 1

What Worked	What did not work
Stops the client from gripping too far forward	Limited space for grip
	Ultimately not what the client wants

Conclusions & Decisions Moving Forward:

1. Guard, while thought to be effective at first, is not what is needed for the client.
2. Stop further work on developing a guard.
3. Work on ideas of molding around the device.

Prototype #2: 4/3/19



Figure 2 a-e: Potential handle designs shaped from styrofoam

Table 2: Pros and Cons of Prototype 2

What Worked	What did not work
Stops the client from gripping too far forward	Some particular handle designs were not well received from student surveys
Provides enough space for the client's hand to move properly	Still unsure of how to attach the handles because of the charging port

Conclusions & Decisions Moving Forward:

1. Find a way to attach to handle without blocking charge port.
 - a. Either make it removable
 - b. Or attach it to side
2. Take apart LiftWare device.
3. Start CADing some handle designs in Solidworks.

Prototype #3 Part 1: 4/10/19

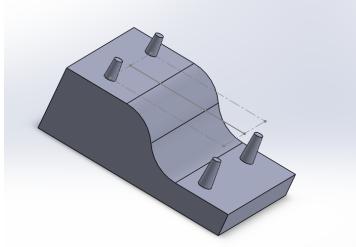


Figure 3a: 1st Version of Peg Placement

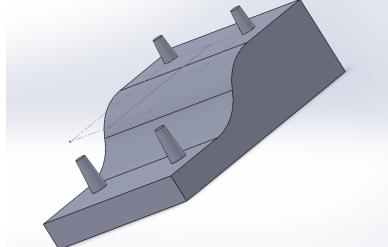


Figure 3b: 2nd Version of Peg Placement

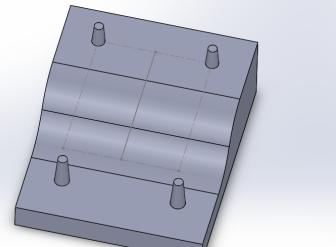


Figure 3c: 3rd and Successful Version of Peg Placement

Table 3: Pros and Cons of Prototype 3

What Worked	What did not work
Version 3 pegs fit	There is still considerable play/wiggle room
	Pegs could be longer to be more secure

Conclusions & Decisions Moving Forward:

1. Peg placement and precise dimensions are confirmed.
2. Develop a model to secure the device that also contains an extension/new handle.
3. Work on ideas of molding around the device.

Prototype #4: 4/17/19

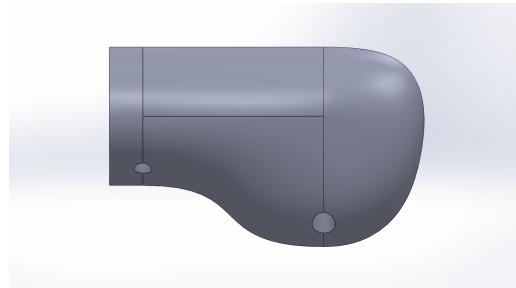


Figure 4a: Mr. Barnes created a model of the LiftWare for the starter file



Figure 4b: Complete, trimetric view of the most updated version

Figure 4c: Back view of the flat design.
Previous versions had puzzle piece design.

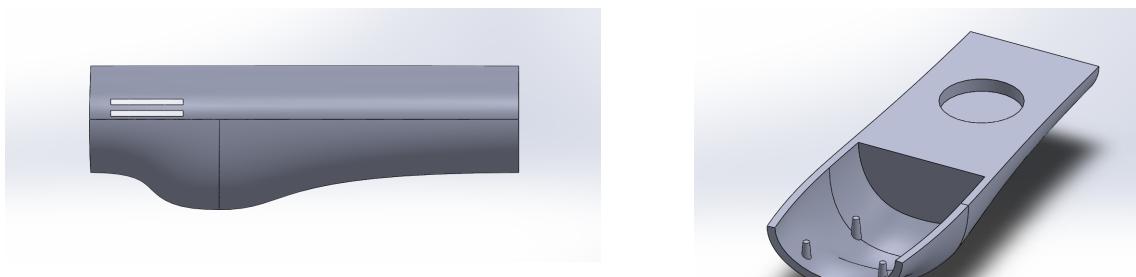


Figure 4d: Side view of the extension

Figure 4e: Trimetric view without the top piece.

Note: “What we know” and “what we don’t know” section cannot be completed without further testing and investigation

Conclusions & Decisions Moving Forward:

1. Explore different methods of securing for the back.
2. Determine if weight affects comfortability at this scale.

Prototype #5: 4/24/19



Figure 5a: Front view of prototype 5 with untrimmed velcro



Figure 4a: Side view of prototype 5

Table 4: Pros and Cons of Prototype 5

What Worked	What did not work
LiftWare fits decently snug inside	Velcro is difficult to manipulate (open/close)
Velcro secures the assembly well	Curvature pushes velcro forward
	Velcro can get dirty easily

Conclusions & Decisions Moving Forward:

1. Change from regular velcro to Dual Lock
2. Handle shape needs to be longer and thinner.
3. The rear end of the device needs to be secured as well.

Prototype #6: 5/01/19

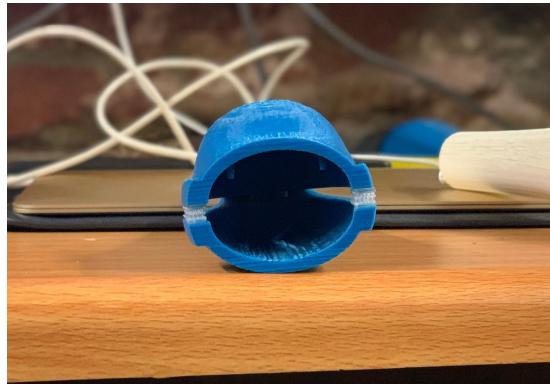


Figure 6a: Front view of prototype 6 with added surface area for Dual Lock

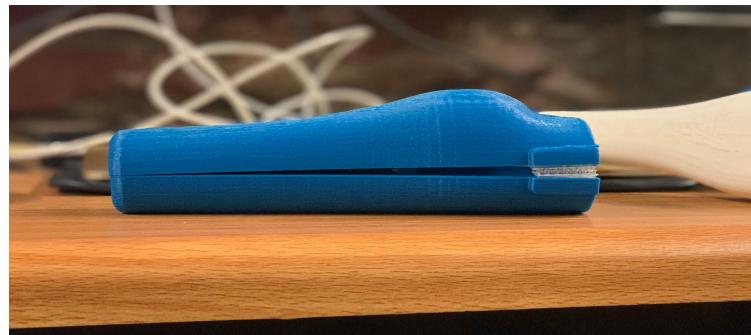


Figure 6a: Side view of prototype 6. The Dual Lock creates a large gap.

Table 5: Pros and Cons of Prototype 6

What Worked	What did not work
Dual Lock functions very well	The Dual Lock creates a gap between halves
Handle shape is longer and thinner	The back is still free to rotate
“Tuna Can” adds some security to the back	There is extra room inside handle behind where the LiftWare sits

Conclusions & Decisions Moving Forward:

1. Stick with Dual Lock, but cut extrude to make two halves flush again.
2. Secure the back even further with a second “Tuna Can”.
3. Change the shape of an interior boss extrude to make the LiftWare fit more snugly.

Prototype #7: 5/02/19

	
<p><i>Figure 7a: Top view of open prototype 7 with a second Tuna Can and better interior fitment</i></p>	<p><i>Figure 7a: Prototype 7 still has a longer, thinner shape</i></p>

Table 6: Pros and Cons of Prototype 7

What Worked	What did not work
The second Tuna Can eliminated rotation	Gap would still exist from Dual Lock
LiftWare sits inside much more snugly	Back ends are not attached in any way

Conclusions & Decisions Moving Forward:

1. Use a hinge on the back face to attach the two halves. A paperclip can be used as a pin.
2. Make the cut extrude to eliminate Dual Lock gap.

Prototype #8: 5/04/19



Figure 8a: Front view of prototype 8 with a new cut extrude to eliminate gap



Figure 8a: Side view of prototype 8 with 2-piece hinge

Table 7: Pros and Cons of Prototype 8

What Worked	What did not work
Gap reduced	Hinge is too small for paperclip
	2-piece hinge is weak
	Hinge pieces do not line up
	Handle should be longer and thinner still

Conclusions & Decisions Moving Forward:

1. Make hinge larger overall.
2. Use 3-piece hinge instead.
3. Separate the hinge cylinders from the main body so parts are not perfectly tangent to each other.
4. Add a small gap (move surface) between two halves for more tolerance.
5. Change handle shape again to be longer and thinner.

Prototype #9: 5/07/19

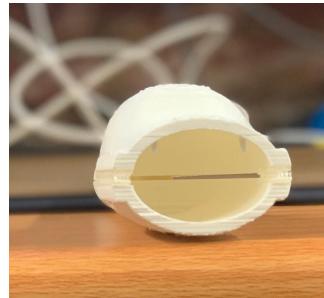


Figure 9a: Front view of prototype 9 with Dual Lock



Figure 9a: Side view of prototype 9 with 3-piece, larger hinge, and paperclip pin

Table 8: Pros and Cons of Prototype 9

What Worked	What did not work
Paperclip fits well	Dual Lock gap is smaller but existent
Hinge pieces line up well	Nowhere to grab and open handle

Conclusions & Decisions Moving Forward:

1. Change cut extrude to make Dual Lock gap smaller.
2. Add tabs on the side to help users remove the LiftWare.

Prototype #10: 5/08/19

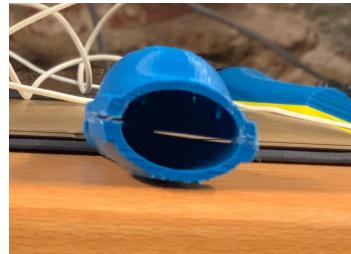


Figure 10a: Front view of prototype 10

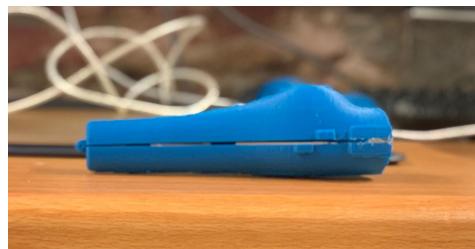


Figure 10a: Side view of prototype 10 with tabs

Table 9: Pros and Cons of Prototype 10

What Worked	What did not work
Tabs do help undo the Dual Lock	Tabs are quite small
	Tabs could be easier to use if flipped

Conclusions & Decisions Moving Forward:

1. Make tabs larger.
2. Flip the tabs so that the bottom-half tab is behind the top-half tab

Prototype #11: 5/10/19



Figure 11: Top view of magnet placement in hot glue

Table 10: Pros and Cons of Prototype 11

What Worked	What did not work
	No strong magnetic attraction

Conclusions & Decisions Moving Forward:

1. Work with just Dual Lock to save time.

Prototype #12: 5/13/19



Figure 12a: Front view of prototype 12



Figure 12a: Side view of prototype 12 with larger tabs and larger cut extrude

Table 11: Pros and Cons of Prototype 12

What Worked	What did not work
Larger tabs are easier to use	New orientation of tabs is more difficult
Dual Lock gap is virtually gone	

Conclusions & Decisions Moving Forward:

1. Use original tab orientation, but make them large.
2. Make an alternative design with a guard in case tab design is too difficult to use

Prototype #13: 5/14/19



Figure 12a: Front view of prototype 13



Figure 12a: Side view of prototype 13 with a guard design instead of tabs

Table 12: Pros and Cons of Prototype 13

What Worked	What did not work
Guard seems effective as a method of taking apart the device	
Dimensions are sufficient for the purpose	

Conclusions & Decisions Moving Forward:

1. Design ready for print in PETG

Prototype #14: 5/15/19



Figure 12a: Front view of prototype 14



Figure 12a: Side view of prototype 14, the tabs design, in PETG

Table 13: Pros and Cons of Prototype 14

What Worked	What did not work
PETG Print was successful	
Resin does not cause a problem with original dimensions	

Conclusions & Decisions Moving Forward:

1. Print guard and other tab orientation as options for the client in PETG
2. Keep Original Dimensions but put paperclip in while resinining so resin does not get stuck in the holes

Prototype #15: 5/15/19



Figure 12a: Front view of prototype 15



Figure 12a: Side view of prototype 15, the guard design in PETG

Table 14: Pros and Cons of Prototype 15

What Worked	What did not work
PETG Print was successful	

Conclusions & Decisions Moving Forward:

1. Print guard and other tab orientation as options for the client in PETG
2. Make sure the guard portions get resined
3. Keep original dimensions