

# **Inconspicuous Ankle Foot Orthosis (AFO) for teen**

October 25th - November 1st 2024

Client: Debbie Eggleston

Advisor: Dr. Brandon Coventry

Team Members:

Anya Hadim (Team Leader)

Lucy Hockerman (BSAC)

Presley Hansen (Communicator)

Alex Conover (BPAG)

Grace Neuville (BWIG)

## **Problem Statement:**

Ankle foot orthoses (AFOs) are designed to provide dorsiflexion support during the swing phase of walking. These devices are primarily used to treat muscular dystrophies. For this project, we are focusing on young individuals diagnosed with Facioscapulohumeral Dystrophy (FSHD), the most common type of muscular dystrophy. The team aims to design a brace for teens that assists with ankle dorsiflexion, promoting safer walking while remaining easily concealable and flexible enough to allow for functional ankle movement. The brace will be tailored specifically for the client, Maggie Eggleston. Key objectives for the device include positioning the ankle in adequate dorsiflexion, maintaining a slim, discreet design, and ensuring sufficient flexibility to minimize movement restriction.

## **Status Update:**

The team finalized the first SolidWorks design of the ankle support and 3D printed it in PLA. We prepared our speaking points for Show and Tell. The team ordered another set of bungee cords to test which ones will work best for the prototype.

## **Summary of Weekly Team Member Design Accomplishments (Include time spent):**

### Anya:

- Met with the team to get the final 3D coordinates of Grace's foot for the SOLIDWORKS design (30 mins)
- Met with Alex to discuss prototype and bungee ideas (30 mins)
- Researched stronger plastic cord locks and better bungee cords (30 mins)
- Researched 3D Arc property manager tool (30 mins)
- Sent out receipts and invoices for the reimbursement (20 mins)

### Lucy:

- Met with the team to get the final 3D coordinates of Grace's foot for the SOLIDWORKS design (30 mins)
- Met with Jack to finish the SOLIDWORKS design (1 hour)
- Wrote an email to ask about using "Runeasi" in our testing protocol (30 mins)

Presley:

- Continued communication with client and advisor (15 min)
- Met with the team to get the final 3D coordinates of Grace's foot for the solidworks design (30 min)

Alex:

- Met with Anya to discuss prototype and bungee ideas (30 min)
- Secured funding from the BME department (1 hour, continuous over multiple weeks)
- Prepared "pitch" for the show and tell 11/1 (30 min)

Grace:

- Met with team to get coordinates for solidworks design (30 mins)
- Met with Jack to finish the solidworks design (1 hour)
- 3D printed first prototype of the support (15 mins)

**Weekly/Ongoing Difficulties**

We are struggling with finding the best type of bungee cords, and what is the best way to attach them to the brace. As well as if a bigger bungee cord will hold better in the current cord locks we have.

**Upcoming Team and Individual Goals**

**Team:**

- Continue fabrication and testing of the initial prototype
- Asses 3D printed support for comfortability

**Individual:**

Anya:

- Meet with team to finalize show and tell taking points and discuss our prototype progress
- Attend show and tell
- Go to REI with Lucy to look at better plastic cord locks and bungee cords
- Purchase foot brace and prepare assembly for full prototype

Lucy:

- Meet with team to finalize show and tell taking points and discuss our prototype progress
- Attend show and tell

Presley:

- Attend show and tell

- Assess the first 3D printed prototype

Alex:

- Attend show and tell
- Finalize our prototype process for testing
- Meet with our advisor to solidify plans for testing and meeting with our client
- Assess 3D printed Prototype

Grace:

- Meet with team to finalize show and tell and discuss our prototype progress
- Attend show and tell
- Assess our first 3D printed prototype

**Project Timeline**

Project Goal	Deadline	Team Member Assigned	Progress	Completed
Meet with Client	9/17/2023		100%	
→ email client with dates		Presley	100%	
→ create question list		All	100%	
→ write summary and put in notebook		All	100%	
PDS Draft	9/22/2023		100%	
→ submit draft		Anya	100%	
Design Ideas and Matrix	9/29/2023		100%	
→ create design 1		All	100%	
→ create design 2		All	100%	
→ create design 3		All	100%	
→ compare designs in matrix		All	100%	
Preliminary Design Presentation	10/06/2023		100%	
→ upload to website		Grace	100%	
Preliminary Deliverables	10/13/2023		100%	
→ email report and notebook		Presley		
→ upload report to website		Grace		
→ peer/self evaluations		All		
Decide on Final Design	10/13/2023		100%	
→ get feedback from client on design		All		
Show and Tell	10/27/2023		100%	

→ create an initial prototype		All		
Final Poster Presentation	12/08/2023		0%	
→ invite client		Presley		
→ post on website		Grace		
Final Deliverables	12/13/2023		0%	
→ submit final notebook and report		Presley		
→ submit peer/self and client evaluations		All		

## Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	
<b>Ankle Brace - Component 1</b>										
Ankle Brace	Cloth brace			Amazon		10/10/2024	1	\$11.90	\$11.90	
Strong glue	medical grade glue								\$0.00	
Gel padding	medical grade padding			Amazon		10/10/2024	1	\$14.99	\$14.99	
Gel sock	Compressive sock to support the carbon fiber			Amazon		10/10/2024	1		\$0.00	
Plastic cord locks	End of the bungee			Amazon		10/10/2024	1	\$3.98	\$3.98	
Fabric	fabric/cloth to sew carbon fiber								\$0.00	
Bungee	Bungee to support			Amazon		n/a (already had)	2	n/a	\$0.00	

	dorsiflexion - use what we have									
<b>Carbon Fiber piece - Component 2</b>										
Carbon Fiber (N/A)									\$0.00	
Metal for prototype	Fabrication of back support								\$0.00	
3D printing prototype	3D printing of back support in PLA					10/31/24	1	\$1.40	\$1.40	
<b>Category 3</b>										
									\$0.00	
									\$0.00	
								<b>TOTAL</b>	<b>: \$30.87</b>	