

Inconspicuous Ankle Foot Orthosis (AFO) for teen

November 15th - November 22th, 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 successfully assembled the final design together and completed the poster for the final presentation. The team has the final design assembled on Maggie's cast and all of the 3D printed elements have been reprinted to her specific dimensions.

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

Anya:

- Ran statistics on all of the raw data (3 hours)
- Met with the team to discuss activities of the week (30 mins)
- Met with the team to finalize the poster (1 hour)
- Worked on the poster and final adjustments (3 hours)
- Worked on final deliverables and notebook (1 hour)

Lucy:

- Gathered raw data for graphs (3 hours)
- Made graphs and worked on testing section of poster (2 hours)

- Met with the team to finalize and edit the poster (2 hour)
- Print the poster (15 mins)

Presley:

- Final Poster presentation work (30 minutes)
- Meeting with the team to determine the activities of the week (30 minutes)
- Final report (30 minutes)
- Update Solidworks Analysis with new material (20 minutes)
- Continued communication with client (10 minutes)

Alex:

- Final Poster presentation work (1 hour)
- Manufacturing (sewing) the final prototype together (2 hours)
- Meeting with the team to determine the activities of the week (30 minutes)
- Final report work (30 minutes)

Grace:

- Met with team to determine activities of the week (30 minutes)
- Met with team to finalize poster (1 hour)
- Final Poster presentation work (1 hour)
- Fabricated the new support with patient's dimensions (1.5 hours)
- Worked on the final report (1 hour)

Weekly/Ongoing Difficulties

The team was not able to print on a Markforged onyx printer, but the team was able to print PLA reinforced with carbon fiber instead.

Upcoming Team and Individual Goals

Team:

- Present final presentation
- Complete final deliverables

Individual:

Anya:

- Finish final deliverables
- Present final project

Lucy:

- Present the final project
- Complete all final deliverables

Presley:

- Complete the final report and other deliverables
- Present at the poster presentation with the team on Friday

Alex:

- Complete Final report
- Present our work on Friday 12/06
- Turn in all materials, and ask what to do with materials bought with BME funds

Grace:

- Finish final deliverables
- Present at poster presentation

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		100%	

→ invite client		Presley		
→ post on website		Grace		
Final Deliverables	12/13/2023		0%	
→ submit final notebook and report		Grace		
→ submit peer/self and client evaluations		All		

Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
Ankle Brace - Component 1										
Ankle Brace	Cloth brace	Abiram		Amazon		10/10/2024	1	\$14.88	\$14.88	Link
Gel padding	medical grade padding	Shechekin		Amazon		10/10/2024	1	\$15.81	\$15.81	Link
Gel sock	Compressive sock to support the carbon fiber	KEMFORD		Amazon		10/10/2024	1	\$15.95	\$15.95	Link
Plastic cord locks	End of the bungee	Headous		Amazon		10/10/2024	1	\$3.98	\$4.20	Link
Nylon Fabric	fabric/cloth to sew carbon fiber	MYUREN		Amazon		11/6/2024	1	\$12.61	\$12.61	Link
Bungee pt 2	stronger bungee to support better dorsiflexion	LuckyStraps		Amazon		10/23/2024	1	18.99	\$20.03	Link
Bungee	thinner bungee	Huouoo		Amazon		10/25/2024	1	\$6.32	\$6.32	Link
Mini caribener	small sized caribener to hold bungee	REI		REI		11/4/2024	1	\$6.00	\$6.00	In-store
Shock cord	thinner and stronger bungee	REI		REI		11/4/2024	1	\$5.95	\$6.61	In-store
Lock laces	lock laces to fix the slipping problem of the plastic cord lock	Lock Laces		Amazon		11/4/2024	1	\$12.65	\$12.65	Link
Fabric Glue	glue to attach the cord locks to the fabric	E6000		Amazon		11/08/2024	1	\$8.14	\$8.14	Link

Needles and Thread	Stronger needles and thread to attatch various fabrics	Basic Home		Amazon	12/03/2024	1	\$8.43	\$8.43	Link	
Carbon Fiber piece - Component 2										
3D printing prototype	3D printing of back support	Bambu printer		Makerspace	11/8/2024	1	1.4	\$1.40		*covered by our given \$50 per team
3D printing prototype - 3 variants	3D printing of back support	Bambu printer		Makerspace	11/12/2024	1	3.8	\$3.80		*covered by our given \$50 per team
3D printing prototype	3D printing of back support	Bambu printer		Makerspace	11/13/2024	1	1.71	\$1.71		*covered by our given \$50 per team
Lock lace piece	3D printing the lock lace piece	Bambu printer		Makerspace	11/18/2024	1	0.23	\$0.23		*covered by our given \$50 per team \$8.71
3D Printing Final Prototype	3D printing of back support	Shen Printer		Makerspace	12/3/2024	1	1.57	\$1.57		*covered by our given \$50 per team
Epoxy Mold - Component 3										
Epoxy	Take cast of the leg	Easy Pour Epoxy		Amazon	11/14/2024	1	\$39.97	\$39.97	Link	
Mold release Agent	PVA release agent - Prevent bonding to the cast	Mrealeazy		Amazon	11/14/2024	1	0	\$0.00		*Used the provided materials in ECB
							TOTAL:	\$189.02		

