

Rise and Stride

February 26st - March 4th, 2025

Client: Debbie Eggleston

Advisor: Prof. John Puccinelli

Team Members:

Madison Michels (mmichels2@wisc.edu), Communicator

Lucy Hockerman (lhockerman@wisc.edu), Team Leader

Presley Hansen (pmhansen3@wisc.edu), BSAC

Sadie Rowe (skrowe2@wisc.edu), BWIG

Kate Hiller (khiller@wisc.edu), BPAG

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 inadequate dorsiflexion, maintaining a slim, discreet design, and ensuring sufficient flexibility to minimize movement restriction.

Brief Status Update:

The team submitted the preliminary report. We also 3D scanned the cast and used the dimensions to create and 3D-print an initial inversion support prototype.

Team Goals:

- Finish the initial prototype by adding cushion and velcro straps with materials found around the makerspace
- Continue researching testing methods and determine if we can use the motion capture system over the weekend
- Schedule a date for Maggie and Debbie to travel to Madison

Individual Accomplishments:

- Lucy:
 - Finalized the preliminary report
 - Met with team to discuss the timeline for future prototypes and testing plans in order to schedule a date for patient testing

- Researched material options for straps and padding
- Finished initial prototype fabrication including sewing and attaching velcro straps and adding padding on the back of the supports
- Presley:
 - Finalized preliminary report
 - Met with the team to 3D print the first iteration of the rigid support design and discuss the timeline for the rest of the semester
 - Attended BSAC meeting
 - Researched padding and strap materials for the brace
- Maddie:
 - Finalized preliminary report
 - Created semester schedule for client reference
 - Contacted client about visiting and design updates
 - 3D printed both iteration of the rigid support design
 - Modeled the rigid support for the inside and outside of the foot in OnShape to prep for 3D printing
 - Assembled the straps onto the rigid support and sewed the velcro straps onto the prototype
 - Added padding to the back of the design
- Sadie:
 - Finalized Preliminary Report
 - Continued testing methods research to refine procedures
 - Reviewed team semester schedule
- Kate:
 - Finalized Preliminary Report
 - Help plan out the rest of the semester schedule to organize the client visiting Madison for testing
 - Researched padding/comfort for braces
 - Met with the team to 3D print the rigid support, decide bungee mechanism for preliminary prototype, and find brace materials

Individual Goals:

- Lucy:
 - Attend individual conference
 - Contact Adam about testing options/advice and write planned protocol
 - Revise and finalize the rigid support
- Presley:
 - Attend individual conference
 - Attend next BSAC meeting
 - Adjust preliminary prototype with team

- Fabricate the bungee mechanism with the team
- Maddie:
 - Finalize our design and dimensions for the rigid support
 - Attend my individual conference
 - Begin drafting testing protocols
 - Reach out for lab access the weekend of April 5th
- Sadie:
 - Analyze preliminary prototype for adjustments
 - Assist in refabrication as needed
 - Find and order gel pads for ankle coverage
 - Individual conference
 - Figure out bungee mechanism for dorsiflexion support
- Kate:
 - Update rigid support dimensions and reprint
 - Attend individual conference
 - Fabricate bungee mechanism – sewing
 - Start writing testing protocol

Design Accomplishments:

The team 3D-printed the inversion support with CF-PLA and plan to complete the initial prototype early this week. The team will discuss necessary changes to the design and reprint or fabricate as needed.

Weekly/Ongoing Difficulties:

Uncertainty in motion capture system for weekend testing.

Project Timeline:

Week	Description	Status
1/24 - 1/31 Week 1	Weekly Team Meeting 1	Complete
	Advisor Meeting 1	Complete
1/31 - 2/6 Week 2	Weekly Team Meeting 2	Complete
	Progress Report 1	Complete
	Have 1st Client Meeting	Complete
	Product Design Specification (PDS) Draft	Complete
	Advisor Meeting 2	Scheduled for 2/5

2/7 - 2/14 Week 3	Weekly Team Meeting 3	Scheduled for 2/14
	Progress Report 2	Due 2/11
	Tong Lecture	Scheduled 2/7
	Advisor Meeting 3	Scheduled 2/12
	Design Matrix	Due 2/13
2/14 - 2/21 Week 4	Weekly Team Meeting 4	Scheduled 2/21
	Preliminary Deliverables Due (2/21)	Due 2/21
	Progress Report 3	Due 2/18
	Advisor Meeting 4	Scheduled 2/19
	Preliminary Presentations	Scheduled 2/21
	Preliminary Presentation Draft	Due 2/19
	Design Consultation Meeting	Scheduled 2/19
2/21 - 2/28 Week 5	Weekly Team Meeting 5	Scheduled 2/20
	Progress Report 4	Due 2/25
	Preliminary Report Due (2/26)	Due 2/26
2/28 - 3/7 Week 6	Weekly Team Meeting 6	Scheduled 2/28
	Progress Report 5	Due 3/4
	Individual Advisor Meetings	Scheduled 4/5
3/7 - 3/14 Week 7	Weekly Team Meeting 7	Scheduled 3/7
	Progress Report 6	Due 3/11
	Advisor Meeting 7	Scheduled 3/12
3/14 - 3/21 Week 8	Weekly Team Meeting 8	Scheduled 3/14
	Progress Report 7	Due 3/18
	Show and Tell	Scheduled 3/21

	Advisor Meeting 8	Scheduled 3/19
Spring Break (3/21 - 3/28)		
3/31 - 4/4 Week 9	Weekly Team Meeting 9	
	Advisor Meeting 9	
	Progress Report 8	
4/4 - 4/11 Week 10	Weekly Team Meeting 10	
	Progress Report 9	
	Advisor Meeting 9	
4/11 - 4/18 Week 11	Weekly Team Meeting 11	
	Progress Report 10	
	Advisor Meeting 10	
4/18 - 4/25 Week 12	Final Poster Presentations (4/25)	
	Progress Report 11	
	Advisor Meeting 11	
4/25 - 5/30 Week 13	Weekly Team Meeting 13	
	Progress Report 12	

Expenses - Spring 2025

Item	Description	Manufa cturer	Mft Pt#	Ven dor	Vend or Cat#	Date	QT Y	Cost Each	Total		Total Budget Spent	Link
Category 1 - Rigid Support												
Velcro	Velcro pieces	Shen Printer		Mak erSp ace		2/28 /202 5	1	\$0.40	\$0.40			
Category 2 - Straps												

CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		Mak erSp ace		2/28 /202 5	1	\$0.82	\$0.82		
									\$0.00		
								TOTAL	: \$1.22	Budget	Spent: <u>0</u>

Expenses - Fall 2024

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Eac h	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		

