Rise and Stride

April 2nd - April 8th, 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 is sending the finalized prototype to the client and patient and creating an easy-to-follow protocol for virtual OpenCap testing.

Team Goals:

- Finish fabrication and express ship prototype
- Begin force plate testing on team member
- Send OpenCap testing protocol and other testing specifications

Individual Accomplishments:

- Lucy:
    - Attended weekly advisor meeting
    - Met with the team to test different foam adherents
    - Tested the brace using the force plates and created stabilograms
    - Helped create an OpenCap testing information video
    - Printed out the OpenCap calibration picture

- Presley:
    - Attended weekly advisor meeting
    - Met with the team to test different foam adherents
    - Attended the BSAC meeting
    - Helped write force plate protocol
- Maddie:
    - Attended weekly group meeting
    - Designed and 3D printed new rigid supports
    - Helped fabricate the foam pads and adhere them to the supports
    - Refined the rigid supports
    - Tested the brace using force plate testing
    - Helped create an OpenCap testing information video
- Sadie:
    - Attended weekly advisor meeting
    - Met with team to discuss fabrication/assembly methods and plan testing
    - Fabricated foam layers for second prototype iteration
    - Fabricated 2 braces to ship to client and an additional to keep for testing purposes
    - Helped create an OpenCap testing information video for client
- Kate:
    - Attended weekly advisor meeting
    - Wrote protocol for force plate testing and tested out the force plates
    - Wrote testing protocol for OpenCap testing
    - Help fabricate more copies of the brace including sewing

Individual Goals:

- Lucy:
    - Send the client the full brace and testing instructions
    - Analyze force testing results
    - Meet with Thomas Ziemer about the project
- Presley:
    - Send client the brace and testing instructions
    - Analyze testing results from force plates
    - Meet with Thomas Ziemer
- Maddie:
    - Send the client the braces and compression sock
    - Complete brace testing on our prototypes (force plates)
    - Analyze testing results
    - Meet with Thomas Ziemer
- Sadie:
    - Ship client the braces and compression sock for testing

    - Complete brace testing with our prototype
    - Meet with Thomas Ziemer
    - Analyze testing results
- Kate:
    - Meet with Thomas Ziemer
    - Perform force plate testing
    - Ensure OpenCap testing protocol is complete

Design Accomplishments:
3D printed the final inversion support shape options, sewed and glued the foam onto the 3 different supports. Finalized the prototype by adding velcro straps.

Weekly/Ongoing Difficulties:
Uncertainty in OpenCap for virtual testing. Concerns about the program's accuracy and reliability to detect minimal changes in ankle, knee and hip angles.

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	Scheduled 4/4
	Advisor Meeting 9	Scheduled 4/2

	Progress Report 8	Due 4/1
4/4 - 4/11 Week 10	Weekly Team Meeting 10	Scheduled 4/11
	Progress Report 9	Due 4/8
	Advisor Meeting 9	Scheduled 4/9
4/11 - 4/18 Week 11	Weekly Team Meeting 11	Scheduled 4/18
	Progress Report 10	Due 4/15
	Advisor Meeting 10	Scheduled 4/16
4/18 - 4/25 Week 12	**Final Poster Presentation**	**Scheduled 4/25**
	Progress Report 11	Due 4/22
	Advisor Meeting 11	Scheduled 4/23
4/25 - 5/30 Week 13	Weekly Team Meeting 13	Scheduled 4/28
	Progress Report 12	Due 4/28
	Final Deliverables Due	Due 4/30

Expenses - Spring 2025

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total		Total Budget Spent	Link
Category 1 - Rigid Support												
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		2/28/2025	1	$0.86	$0.86			
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		3/5/2025	1	$2.42	$2.42			
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		3/14/2025	1	$3.66	$3.66			

Category 2 - Straps and Padding												
Mesh Padding	3D Air Sponge Mesh Fabric	Tong Gu		Amazon		3/7/2025	1	$16.99	$16.99		$16.99	link
Velcro	Velcro pieces			MakerSpace		2/28/2025	1	$0.40	$0.40			
								TOTAL:	**$24.33**	**Budget Spent:**	16.99	

Expenses - Fall 2024

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	**E6000**		Amazon		11/08/2024	**1**	$8.14	$8.14	Link

	fabric										
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**	
								TOT	**$189.0**		

								AL:	**2**	

EXPENSES - Spring 2025

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total		Total Budget Spent	Link
Category 1 - Rigid Support												
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		2/28/2025	1	$0.86	$0.86			
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		3/5/2025	1	$2.42	$2.42			
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		3/14/2025	1	$3.66	$3.66			
Category 2 - Straps and Padding												
Carpet Tape		Capitol	705-1560	Menards	7051560	4/2/2025	1	$7.36	$7.36		$7.36	link
Mesh Padding	3D Air Sponge Mesh Fabric	Tong Gu		Amazon		3/7/2025	1	$16.99	$16.99		$16.99	link
Velcro	Velcro pieces			MakerSpace		2/28/2025	1	$0.40	$0.40			
								TOTAL:	**$31.69**	**Budget Spent:**	24.35	