Rise and Stride

March 12th - March 18th, 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 has fully constructed a functional prototype that incorporates the outside and inside of Maggie's foot. We are beginning to evaluate the prototype through MTS testing, and the team is developing testing protocols for future in-person testing.

Team Goals:

- Complete MTS testing with different 3D print material in-fill percentages
- Write protocols on all anticipated testing methods
- Attend Show and Tell to discuss ways to make our design easier to wear and explore alternative attachment methods for wearing it without a shoe

Individual Accomplishments:

- Lucy:
    - Attended group meetings to discuss testing options
    - Research more on motion capture systems
    - Sent a follow up email to Dr. Adamczyk

    - Sent an email to Claire from BAP about motion capture system availability and suggestions
    - Met with Dr. Adamczyk to discuss testing and prototype recommendations
- Presley:
    - Attended group meeting to discuss testing options
    - Attended BSAC meeting
    - Completed MTS testing on the sports and recorded the results and process
    - Used the MTS data to make graphs of Stress vs Strain for the 3 rigid support pieces
    - Analyzed Stress vs Strain Graph for the 3 rigid supports
- Maddie:
    - Printed the three copies of the outside rigid support for MTS testing in 15%, 35%, and 50% infill
    - Drafted options for foam attachment to the rigid support
    - Attended the group meeting to discuss testing options
    - Researched motion capture options used by the University
    - Attempted to incorporate a gel pad into the rigid support
    - Completed MTS testing on the supports and recorded the results and process
- Sadie:
    - Met with team to plan testing procedures and make testing outlines
    - Completed MTS testing on supports with differing infill (15%, 35%, and 50%)
    - Documented MTS testing in lab archives
    - Researched foam attachment onto rigid support
    - Researched fabrication standardization documents to make design more universal
- Kate:
    - Met with team to plan testing procedures
    - Assisted with printing three copies of the rigid support for testing
    - Conducted MTS 3-point-bend testing on the rigid support
    - Met with client's family friend for input on design
    - Researched the motion capture software we would be using during the client visit
    - Updated expense sheet

Individual Goals:

- Lucy:
    - Write motion capture testing protocol after receiving feedback from Dr. Adamczyk and Claire
    - Prepare with team for show and tell
- Presley:
    - Analyze graphs from MTS data
    - Prepare with team for show and tell

    - Fasten foam to rigid support once it arrives
    - Attend next BSAC meeting
- Maddie:
    - Summarize MTS testing results
    - Determine a way to fasten the foam to the rigid support
- Sadie:
    - Draw conclusions from MTS testing data
    - If materials arrive: determine foam attachment method
- Kate:
    - Analyze raw data collected from MTS testing
    - Create the padding once the materials arrive
    - Prepare for show and tell

Design Accomplishments:
The team 3D-printed multiple versions of the inversion support with CF-PLA and assembled the full prototype, excluding the order foam.

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	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 Presentations (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	Shen		Make		3/14	1	$3.6	$3.6			

	PLA 3D Print	Printer		rSpace		/2025		6	6			
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	**Huoouoo**		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	PVA release agent - Prevent bonding to	**Mrealeazy**		Amazon		11/14/2024	1	0	$0.00	***Used the**	

Agent	the cast									**provided materials in ECB**	
								TOTAL:	**$189.02**		

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	$0.82	$0.82			
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer		MakerSpace		3/5/2025	1	$2.42	$2.42			
Category 2 - Straps												
Velcro	Velcro pieces	Shen Printer		MakerSpace		2/28/2025	1	$0.40	$0.40			
								TOTAL:	**$3.64**	**Budget Spent:**	0	