Rise and Stride

February 19st - February 25th, 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 presented their preliminary presentation and met with Jesse Darley, a design engineer, to discuss 3D scanning and CAD fabrication process. We currently have an initial inversion support design (without patient's dimensions) to begin FEA testing.

Team Goals:

- Edit and submit the preliminary report
- Begin FEA testing on initial inversion support design
- Schedule and attend a time to 3D scan patient's cast

Individual Accomplishments:

- Lucy:
    - Presented the preliminary presentation
    - Attended design consultation meeting with Jesse
    - Met up with group to 3D scan the cast
    - Edited the preliminary report and updated lab archives with new research

- Presley:
    - Presented the preliminary presentation
    - Attended a design consultation meeting with Jesse
    - Edited the preliminary report
- Maddie:
    - Researched carbon fiber PLA material properties for FEA testing
    - Modeled the cast preliminarily in SolidWorks
    - Attended a design consultation meeting with Jesse
    - Performed FEA testing on the model
    - Learned how to 3D scan our cast and created mesh files
    - Presented the preliminary presentation
    - Edited the preliminary report
- Sadie:
    - Researched FEA testing
    - Researched IMU and Motion Capture Testing
    - Attended a design consultation meeting with team and Jesse
    - Learned how to 3D scan cast and created mesh miles for both sides of the cast
    - Presented preliminary presentation
    - Wrote testing, discussion, and conclusion sections of preliminary report
- Kate:
    - Attended preliminary presentations
    - Attended a design consultation meeting with Jesse about our options for 3D scanning
    - Wrote the background information for the preliminary report, including physiology, client information, and PDS
    - Researched more on the DUX4 gene for the preliminary report
    - Learned how to operate new 3D scanner at the Maker Space
    - Scanned the braced to create a mesh file to build a CAD model of our device

Individual Goals:

- Lucy:
    - Finish and complete the preliminary report
    - Create a fabrication protocol for 3D scanning/printing
    - Possibly meet with Jesse again to create a scaled model
    - Talk with team to schedule a client meeting
- Presley:
    - Complete the preliminary report
    - Attend the next BSAC meeting
    - Work with the team to 3D scan the cast and model the rigid support in Solidworks
- Maddie:

    - Determine how to make a scaled model for 3D printing the rigid support
    - Complete the preliminary report
    - Order materials
- Sadie:
    - Order materials
    - Create testing procedures
    - Continue work on mesh created from 3D Scan
- Kate:
    - Continue editing the preliminary report
    - Continue to work on 3D scan
    - Explore how we are going to provide bungee support

Design Accomplishments:
The team has an inversion support designed in onshape based on general leg dimensions.

Weekly/Ongoing Difficulties:
Team discussed difficulties regarding directly thickening/extruding a mesh 3D scan file with Jesse and came up with alternate fabrication plans.

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	
	Progress Report 5	
	Advisor Meeting 6	
3/7 - 3/14 Week 7	Weekly Team Meeting 7	
	Progress Report 6	
	Advisor Meeting 7	
	Tong Lecture	Scheduled 3/7
3/14 - 3/21 Week 8	Weekly Team Meeting 8	
	Progress Report 7	
	Show and Tell	Scheduled 3/21
	Advisor Meeting 8	
Spring Break (3/21 - 3/28)		
	Weekly Team Meeting 9	

3/31 - 4/4 Week 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

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/cloth to sew	**MYUREN**		Amazon		11/6/2	1	$12.	$12.61	Link	

Fabric	carbon fiber					024		61			
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**		