Inconspicuous Ankle Foot Orthosis (AFO) for teen - BME 301

February 20th, 2026 - February 26th, 2026

Client: Debbie Eggleston

Advisor: Dr. Monica Ohnsorg

Team Members:
Alex Conover (Team Leader)
Avery Lyons (Communicator)
Sierra Loosen (BSAC)
Kalob Kimmel (BPAG, BWIG)

Problem Statement:

Ankle-foot orthoses (AFOs) are designed to support dorsiflexion during the swing phase of walking. They are commonly used in managing muscular dystrophies, and for this project, our focus is specifically on adolescents with Facioscapulohumeral Dystrophy (FSHD), the most prevalent form of muscular dystrophy. Our goal is to create a brace that helps teens achieve safer walking by assisting ankle dorsiflexion, while remaining discreet, lightweight, and flexible enough to allow natural ankle motion. The main design priorities are to position the ankle in proper dorsiflexion, keep the brace slim and unobtrusive, and provide enough flexibility to reduce movement restrictions. This project has been ongoing throughout three semesters, and this semester, spring 2026, will be the final semester of the project; the team is hoping to create a device that fulfills all requests, as well as displays significant data.

Status Update:

The team heavily focused on completing the preliminary report this week; normal project work will continue next week. We will also have meetings with our advisor this week as a part of the BME 301 curriculum.

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

<u>Alex:</u>

- Attended BME 301 lecture on 2/25/26 (50 mins)
- Worked on preliminary report (3 hours)
- Lab archives updating (30 min)

<u>Avery:</u>

- Attended BME 301 lecture on 2/25/26 (50 mins)
- Worked on preliminary report (2.5 hours)
- Researched for LabArchives (1.5 hours)

Sierra:

- Attended BME 301 lecture on 2/25/26 (50 mins)
- Worked on preliminary report and updating PDS (3 hours)
- Attended BSAC executive committee meeting on 2/20/26 (50 mins)
- Updated LabArchives (15 minutes)

Kalob:

- Went to lecture on 2/25/26 (50 mins)
- Worked on preliminary report (2 hours)
- Lab archives (2.5 hours)
- Updated website (15 mins)

Weekly/Ongoing Difficulties

The team has been battling midterms in all classes through this week and will also have difficulty next week with more midterms, so progress has slowed just a little bit. Avery is working on getting things set up at Michigan with her ME friend.

Upcoming Team and Individual Goals

Team:

- Analyze the MTS data from testing with the dorsiflexion materials
- Communicate with professors from Michigan to coordinate testing plans (as well as Avery's friends)
- Continue to update lab archives
- Meet with the DI lab to see if they can manufacture our carbon fiber parts

Individual:

Alex:

- Analyze the MTS data from last week (2/19)
- Continue to refine the design
- Communicate with the patient about the brace more
- Assist in contacting Michigan Professors if needed

Avery:

- Communicate with client about preliminary report, progress report, and testing availability
- Continue to communicate with Michigan contact
- Attend lecture and team meeting
- Continue to research and refine the design

Sierra:

- Brainstorm ideas for holding dorsiflexion strap in place
- Assist with MTS testing data analysis

- Attend weekly team meeting and lecture

Kalob:

- Continue brainstorming design improvements
- Attend lecture and team meeting
- Continue updating the website
- Look into testing

Project Timeline

Project Goal	Deadline	Team Member Assigned	Progress	Completed
Meet with Client	02/05/2026		100%	
→ email client with dates	01/27/2025	Avery	100%	
→ receive update from client	02/03/2026	All	100%	
→ write summary and put in notebook	02/03/2026	All	100%	
PDS Draft	02/05/2026		100%	
→ submit draft		Kalob		
Design Upgrades	02/12/2026		75%	
→ Medial/Lateral Design Changes		All		
→ Dorsiflexion Material Changes		All		
Preliminary Design Presentation	02/20/2026		100%	
→ upload to website		Kalob		
Preliminary Deliverables	02/27/2026		00%	
→ email report and notebook		Avery		
→ upload report to website		Kalob		
→ peer/self evaluations		All		
Decide on Final Design	03/06/2026		25%	
→ get feedback from client on design		All		
Show and Tell	03/20/2026		00%	
→ create an initial prototype		All		
Final Poster Presentation	04/27/2026		0%	
→ invite client		Avery		
→ post on website		Kalob		
Final Deliverables	04/29/2026		0%	

→ submit final notebook and report		Avery and Kalob		
→ submit peer/self and client evaluations		All		

Full Expense Report

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

Needles and Thread	Stronger needles and thread to attatch various fabrics	**Basic Home**	12/03/2024	**1**	$8.43	$8.43
Carbon Fiber piece - Component 2						
3D printing prototype	3D printing of back support	**Bambu printer**	11/8/2024	1	1.4	$1.40
3D printing prototype - 3 variants	3D printing of back support	**Bambu printer**	11/12/2024	1	3.8	$3.80
3D printing prototype	3D printing of back support	**Bambu printer**	11/13/2024	1	1.71	$1.71
Lock lace piece	3D printing the lock lace piece	**Bambu printer**	11/18/2024	1	0.23	$0.23
3D Printing Final Prototype	3D printing of back support	**Shen Printer**	12/3/2024	1	1.57	$1.57
Epoxy Mold - Component 3						
Epoxy	Take cast of the leg	**Easy Pour Epoxy**	11/14/2024	1	$39.97	$39.97
Mold release Agent	PVA release agent - Prevent bonding to the cast	**Mrealeazy**	11/14/2024	1	0	$0.00
					TOTAL:	**$189.02**
Spring 2025						
Category 1 - Rigid Support						
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	2/28/2025	1	$0.86	$0.86
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	3/5/2025	1	$2.42	$2.42
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	3/14/2025	1	$3.66	$3.66
CF-PLA (red)	Carbon Fiber PLA 3D Print	Shen Printer	4/4/2025	1	$3.92	$3.92
CF-PLA	Carbon Fiber PLA 3D Print	Shen Printer	4/4/2025	1	$1.94	$1.94
Category 2 - Straps and Padding						
Carpet Tape		Capitol	4/2/2025	1	$7.36	$7.36
Mesh Padding	3D Air Sponge Mesh Fabric	Tong Gu	3/7/2025	1	$16.99	$16.99
Velcro	Velcro pieces		2/28/2025	2	$0.40	$0.80

Fall 2025						
Category 1 - Rigid Support						
CF-PLA	3D printing for testing	Design Innovation Lab	10/27/2025	$2.00	$2.25	$4.50
CF-PLA	3D printed for testing of mediolateral support	Design Innovation Lab	10/27/2025	2	$2.25	$4.50
CF-PLA	3D printing for final product	Design Innovation Lab	11/17/2025	$1.00	$1.90	$1.90
CF-PLA	3D printing for final product	Design Innovation Lab	11/17/2025	1	$2.18	$2.18
CF-PLA	3D printing to send to client	Design Innovation Lab	11/19/2025	1	$2.17	$2.17
CF-PLA	3D printing to send to client	Design Innovation Lab	11/19/2025	1	$2.50	$2.50
Category 2 - Straps and Padding						
Elastic Strap	1 inch wide Polyester and Rubber blend. 10 yd in length	Cisone	10/10/2025	1	$7.99	$7.99
TPU	TPU Test Strip for testing apparatus	Makerspace	10/22/2025	1	$0.39	$0.39
Padding	Air Sponge Mesh Fabric	Tong Gu	10/24/2025	1	$16.99	$16.99
Superglue	Superglue for fabrication	Makerspace	11/4/2025	1	$1.15	$1.15
Superglue	Superglue for fabrication	Makerspace	11/5/2025	1	$1.15	$1.15
Nylon Fabric	Fabric used for straps and padding	Xtreme Sight Line	11/20/2025	1	$0.00	$0.00
Velcro	Velcro pieces	Myuren	11/20/2024	1	$0.00	$0.00
					TOTAL:	**$45.42**
					TOTAL:	**$272.39**