

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

March 20th, 2026 - March 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 received a note from the University of Michigan that we will not be able to use their forceplate and lab for our testing. That sucks. We will be pivoting towards using OpenCap, which we know has been used before for this project, and testing plans will go out to the client and patient, hopefully before or during spring break, and we will virtually collect the data.

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

Alex:

- Attended advisor meeting on 3/20 (30 mins)
- Attended lecture (engineering ethics!) 3/25 (50 min)
- Communicated with UMich regarding testing updates (30 mins)

Avery:

- Attended advisor meeting on 3/20 (30 mins)
- Attended lecture on 3/25 (50 mins)
- Brainstormed ideas for the BME Excellence Award in notebook (30 mins)

- Communicated with client regarding testing updates (15 mins)

Sierra:

- Attended lecture on 3/25 (50 mins)
- Completed makeup show and tell assignment (30 mins)
- Brainstormed info to include in executive summary (30 mins)

Kalob:

- Attend Lecture 3/25 (50 mins)
- Show and tell 3/20 (1 hour)
- Prototyping half sock (1 hour)
- Update website (15 mins)
- Research (1 hour)

Weekly/Ongoing Difficulties

The newest brace hopefully arrived Wednesday, March 25th. We will send virtual testing plans within the next week, as the current plans are for forceplate testing and need to be adjusted.

Upcoming Team and Individual Goals

Team:

- Complete Testing Plans for OpenCap testing
 - Maybe converse with Dr. Wille for any questions about testing
- Begin Executive Summary Draft
- Begin Final Report Draft

Individual:

Alex:

- Complete testing plans for open cap testing.
- Start executive summary.

Avery:

- Complete protocol and testing plans for OpenCap
- Begin Executive Summary for BME Excellence Award

Sierra:

- Help write OpenCap protocol
- Assist with executive summary

Kalob:

- Start executive summary
- Complete testing protocol
- Continue research
- Update website
- Prototyping
- Help with opencap

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		100%	
→ 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		100%	
→ email report and notebook		Avery		
→ upload report to website		Kalob		
→ peer/self evaluations		All		
Decide on Final Design	03/06/2026		100%	
→ get feedback from client on design		All		
Show and Tell	03/20/2026		100%	
→ 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 attach 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