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

February 6th, 2026 - February 12th, 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 worked to complete the design matrix throughout the week, as well as perform other tasks related to the matrix. Most research was done on the materials (TPU, Elastic Polyester, and Ballistic Nylon), and CAD files are being drafted to print and test in the following weeks. The team also communicated with the client to receive an update on the brace, which we are currently waiting on.

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

<u>Alex:</u>

- Attended and participated in BME 301 lecture (50 mins)
- Updated lab archives with 4 new research entries (2 hours)
- Wrote 2 sections of the Design Matrix criteria (30 minutes)
- Met with advisor for weekly meeting on 2/6/26 (30 mins)

- Delegated tasks for the week on Monday (30 minutes)

Avery:

- Attended and participated in BME 301 lecture (50 mins)
- Updated lab archives with 4 new research entries (2 hours)
- Wrote 2 sections of the Design Matrix criteria (1 hour)
- Met with advisor for weekly meeting on 2/6/26 (30 mins)
- Communicated with client via emails throughout the week (30 mins)

Sierra:

- Attended and participated in BME 301 lecture (50 mins)
- Researched materials on our design matrix and updated notebook (2 hours)
- Wrote 2 sections of design matrix criteria (30 mins)
- Met with advisor on 2/6/26 (30 mins)
- Attended BSAC Executive meeting on 2/6/26 (50 mins)

Kalob:

- Attended and participated in BME 301 lecture (50 min)
- Researched and Updated Lab Archives (3 hour)
- Started drafting dog bone cad for stress testing (30 min)
- Worked on the design matrix(1 hour)
- Met with advisor on 2/6/26 (30 min)
- Balanced finances (30 min)
- Updated website (5 min)

Weekly/Ongoing Difficulties

The team is waiting on updates from the University of Michigan professors, and our patient to see what else we need to fix or update regarding the brace.

Upcoming Team and Individual Goals

Team:

- Print the TPU samples for MTS testing
- Perform MTS testing
- Start Preliminary Presentation Slides

Individual:

Alex:

- Continue researching
- Perform MTS testing
- Work on the preliminary presentation for next lecture and final
- Attend team and advisor meetings

Avery:

- Continue researching
- Continue communicating with client
- Begin preliminary presentation slides
- Help with MTS testing the TPU dog bone
- Attend advisor and team meetings
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Sierra:

- Help with MTS testing of material
- Work on preliminary presentation materials
- Continued research on materials
- Attend advisor and team meetings

Kalob:

- Continue Research
- Start working on presentation
- Stress test materials
- Meet with advisor
- Update website
- Update finances as needed

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		50%	
→ Medial/Lateral Design Changes		All		
→ Dorsiflexion Material Changes		All		
Preliminary Design Presentation	02/20/2026		00%	
→ 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		00%	
→ 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**