Inconspicuous Ankle Foot Orthosis (AFO) for teen

September 6th - September 13th, 2024

Client: Debbie Eggleston

Advisor: Dr. Brandon Coventry

Team Members:
Anya Hadim (Team Leader)
Lucy Hockerman (BSAC)
Presley Hansen (Communicator)
Alex Conover (BPAG)
Grace Neuville (BWIG)

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 in adequate dorsiflexion, maintaining a slim, discreet design, and ensuring sufficient flexibility to minimize movement restriction.

Status Update:

The team met with the client to present three design ideas from our design matrix. After discussing the client's needs and preferences, we updated the final design. Then, we prepared the preliminary design presentation to showcase the final designs to the class at the end of the week.

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

<u>Anya:</u>

- Met with team to meet Maggie and discuss design edits (1 hour)
- Researched different mesh for hinge design idea (30 mins)
- Worked on preliminary presentation and preparation (2 hours)
- Worked on Solidworks to design the carbon fiber part of the bungee design (2 hours)

<u>Lucy:</u>

- Met with team to meet Maggie and discuss design edits (1 hour)
- Preliminary presentation work and preparation (1 hour, 30 mins)
- Work on SolidWorks creating the carbon-fiber part of the design (2 hours)

- Research types of tightening mechanisms and discussed the possibility of changing the rotator dial in the original design (45 min)

Presley:

- Met with team to meet Maggie and discuss designs (1 hour)
- Got HIPAA and Human Subjects Research Certificates (1.5 hours)
- Preliminary presentation work (1 hour)
- Continued communication with client and advisor through email (15 minutes)

Alex:

- Emailed Dr. Puccinelli about potentially gaining BME funding for Debbit (20 minutes)
- Continued research on filament types, AFO types, and material types (1 hour)
- Preliminary presentation work (45 minutes)
- Working on the blue permit (I believe) so I can begin prototyping as soon as a final design is made (30 minutes)

Grace:

- Worked on preliminary presentation (1.5 hours)
- Got HIPAA Certification (30 minutes)
- Met with Maggie to discuss our preliminary designs (1 hour)
- Continued researching materials and elasticity strengths (30 minutes)

Weekly/Ongoing Difficulties

We are deciding between doing a bungee cord with a tightening knob at the top of the brace design or incorporating a drawstring mechanism instead.

Upcoming Team and Individual Goals

Team:

- Order the materials needed for the first prototype
- Complete Solidworks design and 3D print the first iteration of the carbon fiber part
- Conduct stress testing on the Solidworks design

Individual:

Anya:

- Present the preliminary design presentation
- Complete the preliminary design report
- Finish the Solidworks part and stress test

Lucy:

- Present the preliminary design presentation
- Complete the preliminary design report
- Finish SolidWorks part and perform stress test

Presley:

- Present the preliminary design presentation
- Complete the preliminary design report
- Continue communication with client

Alex:

- Finish the blue permit so we can begin working in the team lab
- Complete the final design sketch with measurements
- Successfully present our preliminary design to our peers

Grace:

- Complete the preliminary design report
- Present the preliminary design presentation
- Continue researching materials

Project Timeline

Project Goal	**Deadline**	**Team Member Assigned**	**Progress**	**Completed**
Meet with Client	9/17/2023		100%	
→ email client with dates		Presley	100%	
→ create question list		All	100%	
→ write summary and put in notebook		All	100%	
PDS Draft	9/22/2023		100%	
→ submit draft		Anya	100%	
Design Ideas and Matrix	9/29/2023		100%	
→ create design 1		All	100%	
→ create design 2		All	100%	
→ create design 3		All	100%	
→ compare designs in matrix		All	100%	
Preliminary Design Presentation	10/06/2023		100%	
→ upload to website		Grace	100%	
Preliminary Deliverables	10/13/2023		0%	
→ email report and notebook		Presley		
→ upload report to website		Grace		
→ peer/self evaluations		All		
Decide on Final Design	10/13/2023		0%	

→ get feedback from client on design		All		
Show and Tell	10/27/2023		0%	
→ create an initial prototype		All		
Final Poster Presentation	12/08/2023		0%	
→ invite client		Presley		
→ post on website		Grace		
Final Deliverables	12/13/2023		0%	
→ submit final notebook and report		Presley		
→ submit peer/self and client evaluations		All		

Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
Component 1								
Component 2								
Component 3								
TOTAL:								**$0.00**