# Inconspicuous Ankle Foot Orthosis (AFO) for teen

September 12th - September 18th, 2025

**Client:** Debbie Eggleston

**Advisor:** Dr. Justin Williams

**Team Members:**
Alex Conover (Team Leader)
Avery Lyons (Communicator)
Claire Matthai (BSAC)
Aditi Singhdeo (Co-BPAG)
Celia Oslakovic (Co-BPAG)
Sean Carey (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.

**Status Update:**

This week the team accomplished more research on competing designs, important standards we should follow, and other existing patents for AFOs. As a team, we brainstormed three different ideas for our upcoming design matrix, more put together designs will come out soon.

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

<u>Alex:</u>

- Researched different types of AFOs (45 minutes)
- Worked on the PDS (2 hours)
- Researched standards for the PDS (45 minutes)
- Updated Labarchives with client responses (30 minutes)

<u>Avery:</u>

- Researched different materials for AFOs (45 mins)
- Came up with 2 design ideas (1 hour)

- Went over previous teams' notes (1 hour)
- Emailed client about breakage of Spring 2025 AFO and Madison travel times (20 mins)
- Updated citations in the PDS draft (30 mins)

Claire:

- Looked through the lab notebook for Spring 2025, focusing on previous design choices and their problems, materials and fabrication techniques used, and client feedback (1.5 hours)
- Researched existing commercial AFO designs (30 mins)

Aditi:

- Researched the effect of AFOs on gait asymmetry and looked at the mechanism of pneumatic AFOs to understand if something similar can be done in a more discrete way (1.5 hours)
- Came up with a design for the AFO (30 mins)

Celia:

- Looked back on previous semesters' work and noted changes that needed to be addressed in our new design (45 min)
- Researched preexisting AFOs specifically targeting drop foot (45 min)
- Brainstormed new AFO design and sketched new design (30 min)

Sean:

- Researched types of AFOs that already exist (1 hour)
- Read about the previous semester's designs and the problems with them (1 hour)
- Brainstormed ideas for support changes and total brace design (30 min)

**Weekly/Ongoing Difficulties**

We will be testing hopefully within the next 3 weeks, maybe before the preliminary presentations, but material selection will be crucial to creating a solid dorsiflexion component.

**Upcoming Team and Individual Goals**

**Team:**

- Create / Update testing protocols for testing materials and physical testing.
- Create the individual designs (3) for the design matrix
- Continue work on the preliminary presentation

**Individual:**

Alex:

- Create and update the preliminary presentation
- Research and find out where the team can test the new materials

- Continue other research and work on AFO design, and how we can streamline the process of creating a finalized product.

Avery:

- Research materials that can be used for the straps in the new prospective design
- Continue going over previous teams' notes
- Email client with progress report

Claire:

- Contribute at least one additional design concept with sketches/notes
- Look into materials that can be used to improve comfort of the AFO, especially around the bones
- Contribute to the preliminary presentation

Aditi:

- Work on two more possible AFO designs
- Research the difference in the gait cycle for individuals with drop foot compared to normal gait patterns

Celia:

- Work on the more refined designs for the upcoming design matrix.
- Complete more research on AFO's and related patents.

Sean:

- Continue to make changes to the design to improve dorsiflexion
- Come up with ideas to improve comfortability
- Think of ways that the design can be simplified for ease of use

**Project Timeline**

| **Project Goal** | **Deadline** | **Team Member Assigned** | **Progress** | **Completed** |
|---|---|---|---|---|
| Meet with Client | 9/10/2025 | | 100% | |
| → email client with dates | 9/14/25 | Avery | 100% | |
| → create question list | | All | 100% | |
| → write summary and put in notebook | | All | 100% | |
| PDS Draft | 9/18/2025 | | 100% | |
| → submit draft | | Alex | | |
| Design Ideas and Matrix | 9/26/2023 | | 10% | |
| → create design 1 | | All | | |
| → create design 2 | | All | | |

| | | | | |
|---|---|---|---|---|
| → create design 3 | | All | | |
| → compare designs in matrix | | All | | |
| Preliminary Design Presentation | 10/03/2023 | | 0% | |
| → upload to website | | Sean | | |
| Preliminary Deliverables | 10/08/2023 | | 0% | |
| → email report and notebook | | Avery | | |
| → upload report to website | | Sean | | |
| → peer/self evaluations | | All | | |
| Decide on Final Design | 10/10/2023 | | 0% | |
| → get feedback from client on design | | All | | |
| Show and Tell | 10/31/2023 | | 0% | |
| → create an initial prototype | | All | | |
| Final Poster Presentation | 12/05/2023 | | 0% | |
| → invite client | | Avery | | |
| → post on website | | Sean | | |
| Final Deliverables | 12/10/2023 | | 0% | |
| → submit final notebook and report | | Avery | | |
| → 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** | |