# Rise and Stride

April 9th - April 15th, 2025

Client: Debbie Eggleston
Advisor: Prof. John Puccinelli

Team Members:
Madison Michels (mmichels2@wisc.edu), Communicator
Lucy Hockerman (lhockerman@wisc.edu), Team Leader
Presley Hansen (pmhansen3@wisc.edu), BSAC
Sadie Rowe (skrowe2@wisc.edu), BWIG
Kate Hiller (khiller@wisc.edu), BPAG

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

**Brief Status Update:**

Sent the prototype to the patient and client along with testing instructions. Completed force plate stabilogram testing to assess inversion support.

**Team Goals:**

- Help Maggie and Debbie with any testing confusion/technical issues as they are completing at home testing
- Analyze data results
- Revise prototype based on feedback

**Individual Accomplishments:**

- Lucy:
    - Attended weekly advisor meeting
    - Met with Thomas Ziemer
    - Helped finish fabrication and send the prototype
    - Helped create easy-to-follow instructions for OpenCap

    - Edited and finished video tutorial
- Presley:
    - Attended weekly advisor meeting
    - Met with Thomas Ziemer
    - Met with team to complete force plate testing and make OpenCap instructional video
    - Took package to UPS to ship
    - Met with team to divide final deliverables
- Maddie:
    - Attended advisor meeting
    - Met with Thomas Ziemer
    - Finished fabricating the brace
    - Shipped materials to our client
    - Created a shared drive with testing protocols, introduction information, data outputs, and informational videos for the client to perform at-home testing
    - Completed force plate testing
    - Wrote MATLAB code to analyze and graph stabilogram results
- Sadie:
    - Attended weekly advisor meeting
    - Met with Thomas Ziemer to discuss project
    - Completed fabrication of brace and mailed to client
    - Created simple testing instructions for client testing
    - Assisted in force-plate testing
    - Met with team to divide final deliverables
- Kate:
    - Met with Thomas Ziemer
    - Attended advisor meeting
    - Assisted with force plate testing
    - Help record testing video and instructions for opencap at-home testing
    - Finished fabrication of the brace

**Individual Goals:**

- Lucy:
    - Analyze force testing results
    - Analyze OpenCap testing results
    - Refine prototype as needed
- Presley:
    - Analyze OpenCap testing results
    - Update prototype as needed based on client feedback
    - Begin working on final deliverables

    - Attend next BSAC meeting
- Maddie:
    - Analyze OpenCap testing results
    - Refine prototype based on client's recommendations
    - Begin working on final deliverables
- Sadie:
    - Process feedback from client
    - Analyze OpenCap testing results
    - Refine prototype as needed
    - Begin work on final deliverables
- Kate:
    - To work on the final report and poster
    - To get comfortable testing results back from the client and make design changes to the brace
    - Analyze OpenCap testing results from client

**Design Accomplishments:**
Sent the prototype to the patient and clients! Awaiting feedback.

**Weekly/Ongoing Difficulties:**
None, as of now

**Project Timeline:**

| Week | Description | Status |
|---|---|---|
| 1/24 - 1/31<br>Week 1 | Weekly Team Meeting 1 | Complete |
| | Advisor Meeting 1 | Complete |
| 1/31 - 2/6<br>Week 2 | Weekly Team Meeting 2 | Complete |
| | Progress Report 1 | Complete |
| | Have 1st Client Meeting | Complete |
| | Product Design Specification (PDS) Draft | Complete |
| | Advisor Meeting 2 | Scheduled for 2/5 |
| | Weekly Team Meeting 3 | Scheduled for 2/14 |

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| 2/7 - 2/14<br>Week 3 | Progress Report 2 | Due 2/11 |
| | **Tong Lecture** | Scheduled 2/7 |
| | Advisor Meeting 3 | Scheduled 2/12 |
| | Design Matrix | Due 2/13 |
| 2/14 - 2/21<br>Week 4 | Weekly Team Meeting 4 | Scheduled 2/21 |
| | **Preliminary Deliverables Due (2/21)** | Due 2/21 |
| | Progress Report 3 | Due 2/18 |
| | Advisor Meeting 4 | Scheduled 2/19 |
| | Preliminary Presentations | Scheduled 2/21 |
| | Preliminary Presentation Draft | Due 2/19 |
| | Design Consultation Meeting | Scheduled 2/19 |
| 2/21 - 2/28<br>Week 5 | Weekly Team Meeting 5 | Scheduled 2/20 |
| | Progress Report 4 | Due 2/25 |
| | **Preliminary Report Due (2/26)** | Due 2/26 |
| 2/28 - 3/7<br>Week 6 | Weekly Team Meeting 6 | Scheduled 2/28 |
| | Progress Report 5 | Due 3/4 |
| | Individual Advisor Meetings | Scheduled 4/5 |
| 3/7 - 3/14<br>Week 7 | Weekly Team Meeting 7 | Scheduled 3/7 |
| | Progress Report 6 | Due 3/11 |
| | Advisor Meeting 7 | Scheduled 3/12 |
| 3/14 - 3/21<br>Week 8 | Weekly Team Meeting 8 | Scheduled 3/14 |
| | Progress Report 7 | Due 3/18 |
| | Show and Tell | Scheduled 3/21 |
| | Advisor Meeting 8 | Scheduled 3/19 |

| Spring Break (3/21 - 3/28) | | |
|---|---|---|
| 3/31 - 4/4<br>Week 9 | Weekly Team Meeting 9 | Scheduled 4/4 |
| | Advisor Meeting 9 | Scheduled 4/2 |
| | Progress Report 8 | Due 4/1 |
| 4/4 - 4/11<br>Week 10 | Weekly Team Meeting 10 | Scheduled 4/11 |
| | Progress Report 9 | Due 4/8 |
| | Advisor Meeting 9 | Scheduled 4/9 |
| 4/11 - 4/18<br>Week 11 | Weekly Team Meeting 11 | Scheduled 4/18 |
| | Meeting with Thomas Ziemer | Scheduled 4/14 |
| | Progress Report 10 | Due 4/15 |
| | Advisor Meeting 10 | Scheduled 4/16 |
| 4/18 - 4/25<br>Week 12 | **Final Poster Presentation** | **Scheduled 4/25** |
| | Progress Report 11 | Due 4/22 |
| | Advisor Meeting 11 | Scheduled 4/23 |
| 4/25 - 5/30<br>Week 13 | Weekly Team Meeting 13 | Scheduled 4/28 |
| | Progress Report 12 | Due 4/28 |
| | Final Deliverables Due | Due 4/30 |

## Expenses - Spring 2025

| Item | Description | Manufacturer | Mft Pt# | Vendor | Vendor Cat# | Date | QTY | Cost Each | Total | | Total Budget Spent | Link |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Category 1 - Rigid Support** | | | | | | | | | | | | |
| CF-PLA | Carbon Fiber PLA 3D Print | Shen Printer | | MakerSpace | | 2/28/2025 | 1 | $0.86 | $0.86 | | | |
| CF-PLA | Carbon Fiber | Shen | | Make | | 3/5/ | 1 | $2.4 | $2.4 | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PLA 3D Print | Printer | | rSpace | | 2025 | | 2 | 2 | | | |
| CF-PLA | Carbon Fiber PLA 3D Print | Shen Printer | | MakerSpace | | 3/14/2025 | 1 | $3.66 | $3.66 | | | |
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| | | | | | | | | | | | | |
| **Category 2 - Straps and Padding** | | | | | | | | | | | | |
| Carpet Tape | | Capitol | 705-1560 | Menards | 7051560 | 4/2/2025 | 1 | $7.36 | $7.36 | | $7.36 | link |
| Mesh Padding | 3D Air Sponge Mesh Fabric | Tong Gu | | Amazon | | 3/7/2025 | 1 | $16.99 | $16.99 | | $16.99 | link |
| Velcro | Velcro pieces | | | MakerSpace | | 2/28/2025 | 1 | $0.40 | $0.40 | | | |

## Expenses - Fall 2024

| Item | Description | Manufacturer | Mft Pt# | Vendor | Vendor Cat# | Date | QTY | Cost Each | Total | Link | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ankle Brace - Component 1** | | | | | | | | | | | |
| Ankle Brace | Cloth brace | **Abiram** | | Amazon | | 10/10/2024 | 1 | $14.88 | $14.88 | Link | |
| Gel padding | medical grade padding | **Shechekin** | | Amazon | | 10/10/2024 | 1 | $15.81 | $15.81 | Link | |
| Gel sock | Compressive sock to support the carbon fiber | **KEMFORD** | | Amazon | | 10/10/2024 | 1 | $15.95 | $15.95 | Link | |
| Plastic cord locks | End of the bungee | **HeadoUS** | | Amazon | | 10/10/2024 | 1 | $3.98 | $4.20 | Link | |
| Nylon Fabric | fabric/cloth to sew carbon fiber | **MYUREN** | | Amazon | | 11/6/2024 | 1 | $12.61 | $12.61 | Link | |
| Bungee pt 2 | stronger bungee to support better dorsiflexion | **LuckyStraps** | | Amazon | | 10/23/2024 | 1 | 18.99 | $20.03 | Link | |
| Bungee | thinner bungee | **Huouoo** | | Amazon | | 10/25/2024 | 1 | $6.32 | $6.32 | Link | |
| Mini caribener | small sized caribener to hold bungee | **REI** | | REI | | 11/4/2024 | 1 | $6.00 | $6.00 | **In-store** | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| Shock cord | thinner and stronger bungee | **REI** | | REI | | 11/4/2024 | 1 | $5.95 | $6.61 | **In-store** | |
| Lock laces | lock laces to fix the slipping problem of the plastic cord lock | **Lock Laces** | | Amazon | | 11/4/2024 | 1 | $12.65 | $12.65 | Link | |
| Fabric Glue | glue to attach the cord locks to the fabric | **E6000** | | Amazon | | 11/08/2024 | **1** | $8.14 | $8.14 | Link | |
| Needles and Thread | Stronger needles and thread to attatch various fabrics | **Basic Home** | | Amazon | | 12/03/2024 | **1** | $8.43 | $8.43 | Link | |
| **Carbon Fiber piece - Component 2** | | | | | | | | | | | |
| 3D printing prototype | 3D printing of back support | **Bambu printer** | | Makerspace | | 11/8/2024 | 1 | 1.4 | $1.40 | ***covered by our given $50 per team** | |
| 3D printing prototype - 3 variants | 3D printing of back support | **Bambu printer** | | Makerspace | | 11/12/2024 | 1 | 3.8 | $3.80 | ***covered by our given $50 per team** | |
| 3D printing prototype | 3D printing of back support | **Bambu printer** | | Makerspace | | 11/13/2024 | 1 | 1.71 | $1.71 | ***covered by our given $50 per team** | |
| Lock lace piece | 3D printing the lock lace piece | **Bambu printer** | | Makerspace | | 11/18/2024 | 1 | 0.23 | $0.23 | ***covered by our given $50 per team** | **$8.71** |
| 3D Printing Final Prototype | 3D printing of back support | **Shen Printer** | | Makerspace | | 12/3/2024 | 1 | 1.57 | $1.57 | ***covered by our given $50 per team** | |
| **Epoxy Mold - Component 3** | | | | | | | | | | | |
| Epoxy | Take cast of the leg | **Easy Pour Epoxy** | | Amazon | | 11/14/2024 | 1 | $39.97 | $39.97 | Link | |

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|---|---|---|---|---|---|---|---|---|---|---|
| Mold release Agent | PVA release agent - Prevent bonding to the cast | **Mrealeazy** | | Amazon | | 11/14/2024 | 1 | 0 | $0.00 | ***Used the provided materials in ECB** |
| | | | | | | | | **TOTAL:** | **$189.02** | |

## EXPENSES - Spring 2025

| Item | Description | Manufacturer | Mft Pt# | Vendor | Vendor Cat# | Date | QTY | Cost Each | Total | | Total Budget Spent | Link |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Category 1 - Rigid Support** | | | | | | | | | | | | |
| CF-PLA | Carbon Fiber PLA 3D Print | Shen Printer | | MakerSpace | | 2/28/2025 | 1 | $0.86 | $0.86 | | | |
| CF-PLA | Carbon Fiber PLA 3D Print | Shen Printer | | MakerSpace | | 3/5/2025 | 1 | $2.42 | $2.42 | | | |
| CF-PLA | Carbon Fiber PLA 3D Print | Shen Printer | | MakerSpace | | 3/14/2025 | 1 | $3.66 | $3.66 | | | |
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| | | | | | | | | | | | | |
| **Category 2 - Straps and Padding** | | | | | | | | | | | | |
| Carpet Tape | | Capitol | 705-1560 | Menards | 7051560 | 4/2/2025 | 1 | $7.36 | $7.36 | | $7.36 | link |
| Mesh Padding | 3D Air Sponge Mesh Fabric | Tong Gu | | Amazon | | 3/7/2025 | 1 | $16.99 | $16.99 | | $16.99 | link |
| Velcro | Velcro pieces | | | MakerSpace | | 2/28/2025 | 1 | $0.40 | $0.40 | | | |
| | | | | | | | | **TOTAL:** | **$31.69** | **Budget Spent:** | 24.35 | |