

Safe Shower Solution for Below-the-Knee Amputee

Progress Report 5

October 2, 2026 – October 9, 2026

Client: Mike DeGrave

Advisor: Prof. Murphy

Team:

Sam Dudek - dudek4@wisc.edu (Co-Team Leader)
Ben Willihnganz - bwillihnganz@wisc.edu (Co-Team Leader)
Claire Matthai - cematthai@wisc.edu (Communicator)
Katelyn Williams - kmwilliams37@wisc.edu (BWIG)
Kimberly Jarrard - kjarrard@wisc.edu (BPAG)
Marcus Wentzel - mfwentzel@wisc.edu (BSAC)

Problem Statement

Below-the-knee amputees are unable to wear their prosthetic in the shower, as most prosthetic legs are not waterproof and are prone to corrosion and slippage. This forces individuals to either remove their prosthetic and shower while seated, or attempt to stand on one leg using unsafe workarounds - both of which carry significant fall risk. The objective of this project is to design a device that gives below-the-knee amputees the autonomy to safely enter, stand, and bathe in the shower without their prosthetic, restoring independence and reducing injury risk during a daily activity. This project is being developed in partnership with Mike DeGrave, a below-the-knee amputee whose personal experience with this challenge is the driving inspiration behind the work.

Brief Status Update

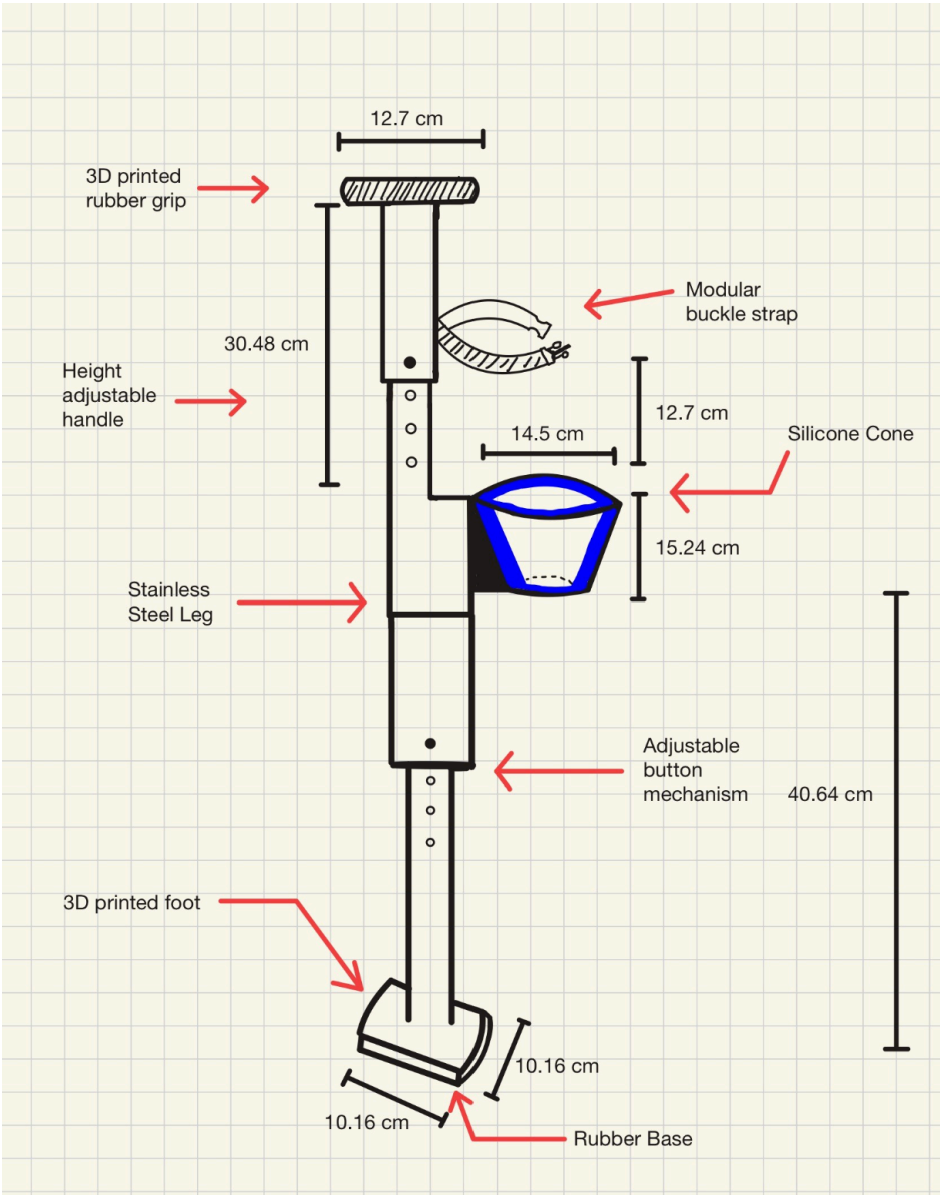
This week the team worked to create an accurate and progressive preliminary report that could effectively move the team forward and give the project direct action while highlighting critical design decisions and criteria. The team met early in the week to discuss specifics of the preliminary report and go over presentation successes. Brainstorming and researching were furthered this week in order to prepare for prototyping as well.

Difficulties / Advice Requests

N/A

Current Design

Modified Air Jordan:



Materials and Expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	

Category 2									
									\$0.00
									\$0.00
								TOTAL:	\$0.00

Goals

Major team goals for the next week

1. Meet as a team to discuss in person client meeting and what every individual should know about Mike DeGrave and his story, process, and overall thoughts
2. Implement research and brainstorming done by the team and put together an order report for initial testing.

Next week's individual goals

- Sam Dudek
 - Meet with Mike and Sharon to get measurements, pictures, and possibly a scan of his residual limb
 - Start researching prototyping methods and gather ideas for that process
 - Research materials that meet design requirements
- Ben Willihnganz
 - Research materials that meet design requirements
 - Look into materials alternative to aluminium that is still cheap specifically
 - Brainstorm ideas for testing and prototyping before materials arrive
- Claire Matthai
 - Work with team to create a list of materials for our first order
 - Schedule a design fabrication consultation with Jesse (Grainger Design Lab)
 - Communicate with client and family to find a date for them to travel to Madison in November
- Katelyn Williams
 - Utilize measurements from in-person meeting to develop more precise dimensions of the handle and cone
 - Research materials for the cone portion that are biocompatible and resilient
 - Brainstorm fabrication plans for integration of modular pieces
- Kimberly Jarrard
 - Use measurements obtained from the client to adjust our design
 - Look into materials that are suitable and start our fabrication plan
 - Continue brainstorming ideas and improve our preliminary design
- Marcus Wentzel
 - Determine the optimal diameter of the cone based on the dimensions of our client's leg

- Compare the possible materials for the leg of the prosthetic and determine the most cost effective and practical material
- Look into ordering material and determine our plan to 3D print

Timeline

Task	September				October					November				Dec	
	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11
Project R&D															
Brainstorm	X	X	X	X											
Research		X	X	X	X										
Prototyping & Fabrication															
Testing & Validation															
Deliverables															
Progress Reports		X	X	X	X										
PDS			X												
Design/Decision Matrix Criteria				X											
Prelim Presentation					X										
Show and Tell															
Final Poster															
Meetings															
Client			X	X	X										
Advisor	X	X	X												
Website															
Update	X	X	X	X	X										

Filled boxes = projected timeline

X = task was worked on or completed

Detailed Accomplishments

This week, our team focused heavily on preparing for our preliminary report by assigning individual sections, drafting individual sections, and revising as a group. The team also put some focus into material selection and finding a high yield material that will be easily prototyped and tested.

Previous Week's Goals and Accomplishments

- Sam Dudek
 - Complete my section of the preliminary report and do a final check over before turning in
 - Help use our clients feedback to create our final design
 - Start brainstorming material procurement and fabrication for our design

- Possibly meet the client in Green Bay to get specific measurements and meet him
- Ben Willihnganz
 - Research and write the preliminary report using feedback from presentation and from client
 - Look into materials alternative to aluminium that is still cheap, but more durable and scratch resistant
 - Brainstorm ideas for how to create a completely modular design
- Claire Matthai
 - Present preliminary presentation with team
 - Complete my section of the preliminary report
 - Look into other material options for the leg (stainless steel and titanium, specifically)
 - Brainstorm fabrication methods
- Katelyn Williams
 - Present preliminary design presentation with team
 - Brainstorm and research design materials based on final design and client feedback
 - Finalize my section of the preliminary report
 - Potentially coordinate meeting with client in Green Bay for dimensions
- Kimberly Jarrard
 - Present preliminary design presentation with the team
 - Continue brainstorming designs and materials based on client feedback
 - Complete the preliminary report
 - Plan meeting date with client
- Marcus Wentzel
 - Present our preliminary presentation on Friday
 - Update the final design with the preferences and suggestions from our client
 - Finalize the materials for the prototype, and look into ordering them vs 3D printing them
 - Complete the preliminary report

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Sam Dudek		Research more background information to input into our preliminary report	.5	4.5	19
		Reviewed and revised our preliminary report to make it ready for submission	1.5		
		Created my portion of the preliminary	2.5		

		report			
Ben Willihnganz	10/6	Looked into testing protocols highlighted in standards of the PDS and utilized them in writing testing portion of the preliminary report	2	4	19
	10/6	Compiled more research into standards for testing	0.5		
	10/7	Revised and review the preliminary report and prepared it for submission	1.5		
Claire Matthai	10/6	Researched titanium material properties and evaluated its suitability for the project. Investigated commercially available titanium components for potential integration into the design.	1	4	18.5
	10/5-6	Completed the Design #3, Materials, and Methods sections of the preliminary report. Researched available 3D printing filaments in Wendt and developed a preliminary fabrication plan based on selected materials.	3		
Katelyn Williams	10/5-6	Completed the Design #1, Motivation, Existing Devices and Current Methods, and Problem Statement sections of the preliminary report.	2.5	3.5	15.5
	10/5	Researched the global impact of our final design beyond the client's needs.	1		
Kimberly Jarrard	10/05	Completed the design matrix section of the Preliminary report	1.5	3	12.25
	10/6	Continued to brainstorm ideas and looked into possible materials.	1.5		
Marcus Wentzel	10/4	Updated the Air Jordan design with client's preferences. Added the updated version to the preliminary report.	1	4	15.5
	10/5	Complete the design 2, final design,	2.5		

		and discussion portion of the preliminary report			
	10/5	Research new materials (stainless steel) for the leg of the prosthetic	0.5		