Amputee Advanced Donning Device

Date: 10/30/2026 - 11/5/2026

Client: Dr. Daniel Kutschera
Advisor: Dr. Justin Williams

Team:

Freyja Heggeland - Team Leader (heggeland@wisc.edu)

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Problem statement: During physical rehabilitation, it is critical for amputee patients to wear a specialized compression garment known as a shrinker sock. A shrinker sock aims to shape the residual limb in preparation for prosthetic fitting and prevent post-operative complications like swelling and excess fluid retention. To apply the shrinker, patients currently rely on basic donning tubes, where the shrinker is stretched over a plastic tube and pulled over the residual limb. Because shrinkers are designed to apply strong, consistent compression, they can be very difficult to stretch over donning tubes. This challenge is especially significant for elderly patients, who may have limited strength, dexterity, or mobility. This project aims to create an advanced donning device that stretches the garment to the desired diameter using electronics and mechanical means, simplifying shrinker application and eliminating the need for manual user input to stretch the garment.

Brief status update: This week, the team took advice and thoughts from other students when considering the Show and Tell event sponsored by the BME Department. The team was able to gather insight into further design ideas and have begun to implement them into the design and its overall considerations. The team also met with the client to discuss current progress and next steps with the design.

Difficulties / advice requests: None to report

Current design:



Materials and expenses:

Item	Description	Manufac-turer	Mft Pt#	Vend-or	Vend-or Cat #	Date	#	Cost Each	Total	Link
Materials										
3D filament	PLA	UW Makerspace	UW Makerspace	UW Makerspace	UW Makerspace	10/16/2026	1	$6.21	$6.21	https://making.engr.wisc.edu/
3D filament	PLA	UW Makerspace	UW Makerspace	UW Makerspace	UW Makerspace	10/23/2026	1	$4.80	$4.80	https://making.engr.wisc.edu/
NEMA17 Stepper Motor	Nema 17 Stepper Motor Bipolar 1.5A 1.8 Degree 45Ncm 12V for DIY CNC/ 3D Printer/Extruder	Oyosteppe r	17HS15-1504S-X1	Oyostepper	-	10/26/2026	1	$10.13	$10.13	https://www.oyostepper.com/goods-493-Nema-17-Stepper-Motor-Bipolar-1.5A-18deg-45Ncm-12V-for-DIY-CNC-3D-PrinterExtruder.html
50:1 Planetary Gearbox	TQMG Series Planetary Gearbox Gear 50:1 Backlash 50 Arc-min for Nema 17 Stepper Motor BLDC Motor & Servo Motor	Oyosteppe r	TQMG 17-G50	Oyostepper	-	10/26/2026	1	$28.69	$28.69	https://www.oyostepper.com/goods-1157-PLM-Series-Planetary-Gearbox-Gear-50-1-Backlash-50-Arc-min-for-Nema-17-Stepper-Motor.html

Major team goals for the next week

1. Continue fabrication drafts with new CAD models
2. Revisit existing CAD models as a group, begin testing, modify design

Next week's individual goals

- Freyja Heggeland
    - Continue constructing testing protocols for existing prototype
    - Begin formally testing and documenting results
- Adam Bauer
    - Continue to work on a final CAD model
- Megan Pearson
    - Prepare for testing by wrapping up fabrication
- Carl Assmus
    - Construct a circuit from the parts that have been ordered
    - Create a working model for the final circuit prototype using tinkerCAD

Timeline

Task	Week				Week					Week				Week	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Project R&D															
Empathize	X	X													
Background	X	X	X	X											
Prototyping					X	X	X	X	X	X					
Testings										X					
Deliverables															
Progress Reports	X	X	X	X	X	X	X	X	X	X					
Prelim presentation					X										
Final Poster															
Meetings															
Client	X				X					X					
Advisor	X	X	X	X	X	X	X	X		X					
Website															
Update	X	X	X	X	X	X	X	X	X	X					

Filled boxes = projected timeline
X = task was worked on or completed

Previous week's goals and accomplishments

- Freyja Heggeland
    - Create testing protocols and assist team fabrication of our final design
- Adam Bauer
    - Brainstorm testing protocols

    - Help fabricate final design
- Megan Pearson
    - Created preliminary testing protocols
- Carl Assmus
    - Bought electrical components that are necessary for the circuit that we plan on building
    - Brainstormed testing procedures

Activities

Name	**Date**	**Activity**	**Time (h)**	**Week Total (h)**	**Sem. Total (h)**
Freyja	11/5/2026 11/6/2026	- Additional filament research - Continued makerspace consultation, visiting CAD files and constructing new ideas for device stability.	1 3	4	31
Adam	11/4/2026 11/5/2026 11/5/2026	- Filament Research - Worked on CAD files - Research/brainstorm testing protocols	1 2.5 1	4.5	24
Megan	11/2/2026 11/4/2026	- Met with the client - Created testing protocols	.5 2.5	.5 2.5	22.5
Carl	11/2/2026 11/4/2026	- Client Meeting - Bought electrical components	0.5 0.5	1	26.5