Amputee Advanced Donning Device

Date: 11/6/2026 - 11/12/2026

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 worked on wrapping up fabrication steps by printing additional arms, composed fabrication protocols, and constructed circuitry diagrams to better show the electronic pathway of the system.

Difficulties / advice requests: None to report

Current design:



Figure 1: AADD Team's current model, separated by main CAD pieces.

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 Maker space	UW Maker space	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-15A-18deg-45Ncm-12V-for-DIY-CNC-3D-PrinterExtruder.html
50:1	TQMG Series	Oyosteppe	TQ	Oyost	-	10/2	1	$28.69	$28.69	https://ww

Planetary Gearbox	Planetary Gearbox Gear 50:1 Backlash 50 Arc-min for Nema 17 Stepper Motor BLDC Motor & Servo Motor	r	MG 17-G50	epper		6/20 26				w.oyostepper.com/goods-1157-PLM-Series-Planetary-Gearbox-Gear-50-1-Backlash-50-Arc-min-for-Nema-17-Stepper-Motor.html
Buck Converter	MPM3610 5V Buck Converter Breakout	Adafruit	4739	Adafruit	-	11/04/2026	1	$6.95	$6.95	https://www.adafruit.com/product/4739
Motor Driver	TMC2209 Stepper Motor Driver	Adafruit	6121	Adafruit	-	11/04/2026	1	$8.95	$8.95	https://www.adafruit.com/product/6121
Battery Pack	Talentcell Rechargeable 12V 6000mAh/5V 12000mAh DC Output	Talentcell	-	Amazon	-	11/04/2026	1	$33.99	$33.99	https://www.amazon.com/dp/B00ME3ZH7C
Pigtail Adapter	0.8FT 5.5mmx2.1mm DC 14AWG Pigtail Cable Female Cable	IMIYORE	-	Amazon	-	11/04/2026	1	$7.99	$7.99	https://www.amazon.com/dp/B0DXTP3KNY

Major team goals for the next week

1. Continue and complete testing with the prototype
2. Begin thinking about poster design and contents

Next week's individual goals

- Freyja Heggeland
    - Complete testing with prototype
    - Possibly begin final print with more durable filament
    - Verify existing information and refine protocols
- Adam Bauer
    - Help with testing and printing
- Megan Pearson
    - Complete testing

- Carl Assmus
    - Help to complete testing of the prototype
    - Build the final circuit for the prototype

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	X				
Deliverables															
Progress Reports	X	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	X				
Website															
Update	X	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
    - Continue constructing testing protocols for existing prototype
    - Begin formally testing and documenting results
- Adam Bauer
    - Printed additional arms
- Megan Pearson
    - Prepared outreach activity guide
    - Continued preparing for testing
- Carl Assmus
    - Began creating a tinkerCAD model of the final circuit

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)

Freyja	11/10/2026	- Researching load supports and methods we can use to adapt design to increased load	1.5	1.5	32.5
Adam	11/6/2026	- Printed out more arms	0.5	0.5	24
Megan	11/12/2026	- Prepared outreach documents - Continued preparing for testing	1	1	23.5
Carl	11/10/2026	- Began using tinkerCAD	1	1	27.5