

Knee Crutch

Date: 10/30/25

Client: Daniel Kutschera

Advisor: Randy Bartels

Team:

Violet Urdahl - Team Leader (vurdahl@wisc.edu)

Tess Fitzgerald - Communicator (tkfitzgerald@wisc.edu)

Aubrey Younker - BPAG (ayounker@wisc.edu)

Lauren Anderson - BSAC (ldanderson6@wisc.edu)

Kayla Christy - BSAC (kjchristy@wisc.edu)

Evan Koelemay - BWIG (ekoelemay@wisc.edu)

Problem Statement:

Knee crutches are an assistive device used to help non-weight-bearing patients recovering from a lower limb injury move efficiently and comfortably. Current devices available target assistance with walking, but are not suitable for ascending or descending stairs. To ensure patients can get home safely, the improved knee crutch will provide ample stability and assistance for stair climbing without the additional use of crutches. The goal is to create an improved version of an existing prototype that will provide users with sufficient mobility and stability when climbing stairs.

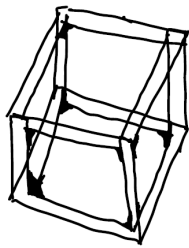
Brief Status Update:

The team began fabrication of our prototype this week. The legs and base frame have been assembled, and we also received parts for the handle that will be attached to the frame. The team also set up a design consultation to assess how we may approach the fabrication of the knee rest component of our prototype. Finally, the team prepared for this week's show and tell.

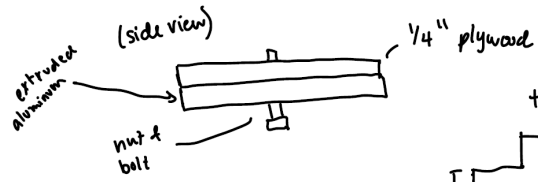
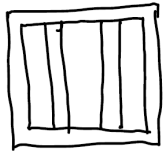
Project Difficulties/Advice Requests:

- None to report

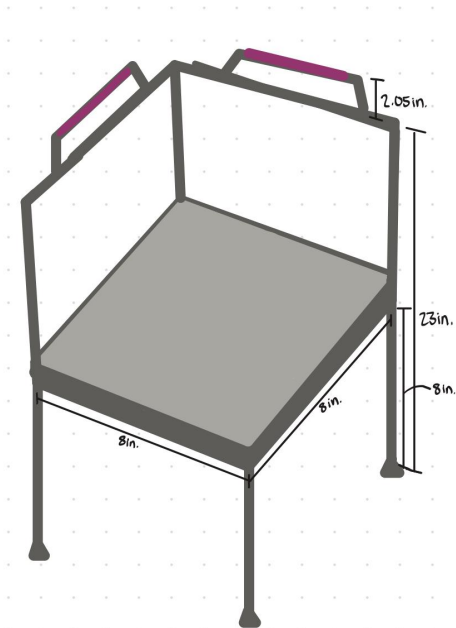
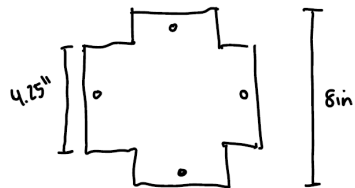
Current Design:



top view:
2 braces (extruded aluminum)



top view of plywood



Materials and Expenses:

- See table below:

Item	Description	Manufacturer	Date	#	Cost Each	Total	Link
HDP	3D printing material for knee support	Makerspace	Have not purchased	N/A	N/A	\$0.00	
Extruded Aluminum Set with Connectors	Material for legs and knee support frame	Home Depot	Purchased on 10/10	1 set of 4 rods and connector sets	\$43.70	\$43.70	link
Memory foam cushion	Material for knee to rest directly on	TBD	Have not purchased	N/A	N/A	\$0.00	
Rubber base	Material for non-slip bottom base	Amazon	Have not purchased	N/A	N/A	\$0.00	
Additional Connectors for Extruded Aluminum rods	Set of 10 extruded aluminum rod connectors	Amazon	Purchased on 10/10 and 10/24	2 set of 10 connectors	\$12.99	\$25.98	link
Aluminum T-slot Handles	Set of 4, 7.5in aluminum handles compatible with t-slotted aluminum	Amazon	Purchased on 10/24	1 set of 4 handles	\$27.59	\$27.59	link
Grip Tape	Pack of 10 small rolls of multicolor grip tape	Amazon	Purchased on 10/24	1 pack of 10 rolls	\$9.99	\$9.99	link
					TOTAL:	\$110.37 with Tax	

Team Goals for Upcoming Week:

- Meet with our client to discuss progress and receive feedback
- Use peer feedback to improve our device design and usability
- Complete the next stage of fabrication: knee rest
- Begin writing detailed testing protocols to submit for an IRB

Individual Goals for Upcoming Week:

- Tess Fitzgerald
 - Attend design consultation
 - Finish fabrication of the prototype
 - Begin outlining the testing protocol
- Aubrianna Younker
 - Place an order with any remaining materials needed
 - Organize and fill in gaps in the team's Lab notebook to correctly reflect our progress thus far
 - Cut extruded aluminum rods to size for the handle frame, and look into new T-slot bolts compatible with our handle of choice
- Lauren Anderson
 - Get advice from peers on our progress so far at the show and tell on Friday
 - Attend the design consultation to understand how to best fabricate our project
 - Order materials for the knee cushion
 - Continue fabricating
- Violet Urdahl
 - Conduct research on human research/ an IRB
 - Attend design consultation
 - Begin fabrication of knee rest
- Kayla Christy
 - Attend the design consultation
 - Update my LabArchives
 - Begin fabrication of our prototype
 - Attend Show and Tell
- Evan Koelemay
 - Receive feedback during show and tell
 - Assist on remaining fabrication

Timeline

Task	September				October				November					December	
	5	12	19	26	3	10	17	24	31	7	14	21	28	5	10
Deliverables															
Progress Reports		X	X	X	X	X	X	X							

PDS Draft			X												
Design Matrix				X											
Preliminary Presentations					X										
Preliminary Lab Notebook						X									
Preliminary Report						X									
Preliminary Evaluations						X									
Show and Tell															
Final Poster Presentation															
Final Lab Notebook															
Final Report															
Final Evaluations															
Meetings															
Team	X		X	X	X	X	X	X							
Client	X			X		X									
Advisor			X		X		X	X							
Website															
Update	X	X	X	X	X	X	X	X							

Previous week's goals and accomplishments:

- Tess Fitzgerald
 - Drafted show and tell elevator pitch
 - Consulted with Design and Innovation for knee rest fabrication plans
 - Met with team to fabricate base component of design
- Aubrianna Younker
 - Ordered additional connectors and components for the device's handle
 - Updated expense spreadsheet reflecting new purchases
 - Drafted a Show and Tell reference elevator pitch
 - Looked into how to submit an IRB
- Lauren Anderson
 - Adjusted the design to fit with the fabrication possibilities for the knee rest
 - Researched testing methods
 - Attend the BSAC meeting with faculty and shared notes with team
- Violet Urdahl
 - Determined dimensions of base
 - Cut aluminum rods to length
 - Fabricated legs and base frame of device
 - Determined team elevator pitch for show and tell

- Completed human subjects training
- Evan Koelemay
 - Determined base dimensions
 - Estimated frame weight
 - Studied notes for show and tell
- Kayla Christy
 - Attended BSAC meeting
 - Did research on the handle grip
 - Created a new sketch of our current prototype design
 - Completed Chemical Safety Training
 - Updated LabArchives folder for Trainings throughout the curriculum

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Violet Urdahl	10/30/25	Fabricated base	2	2	18.5
Aubrianna Younker	10/30/25	Ordered additional materials, prepared for show and tell, and IRB research	2 hrs	2hrs	20hrs
Tess Fitzgerald	10/30/2025	Show and tell prep, knee rest design brainstorming, innovation lab design consult, updated design drawing	2h	2h	18h
Lauren Anderson	10/30/25	Researching testing, attending BSAC, working on design adjustments	2hrs	2hrs	18h
Evan Koelemay	10/30/25	Trainings, show and tell prep, base fabrication meeting	1.5 hrs	1.5 hrs	17hrs
Kayla Christy	10/30/25	Trainings, updated prototype sketches, attending BSAC meetings	2 hrs	2 hrs	21h
Small Group Meeting	10/24/25	Decided on dimensions for base and fabrication plan	1h		1h
Whole Team	10/27/25	Show and tell prep, design constellation prep, base fabrication	1h		15.5h
Whole Team + Advisor Meeting	10/24/25	Materials decision making, fabrication planning, design deliberation	1.5h		