

Knee Crutch

Date: 9/16/24

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 was able to meet with Dr. Puccinelli while Professor Bartels was traveling to discuss goals for the semester, understanding of the project, and expectations for the device.

Additionally, we were in contact with Professor Bartels to set up a meeting time when he returns. A strong first draft of our PDS has been completed using information from the client, as well as supplementary research.

Project Difficulties/Advice Requests:

- What are some factors to take into consideration when choosing to make this device custom to specific patients or adjustable?

Current Design

- This project is still in the research phase. There is no current prototype or design as of this week.

Materials and Expenses:

- None to report, see table below:

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	
								TOTAL:	\$0.00	

Team Goals for Upcoming Week:

- Brainstorm 1-2 design ideas each and share them with the group, so we can begin narrowing down ideas for our design matrix
- Research and decide on the most important components of this device to use as criteria in our design matrix

Individual Goals for Upcoming Week:

- Tess Fitzgerald
 - Brainstorm design ideas
 - Communicate with client to answer any questions that have come up
 - Finalize mechanical specifications for prototype
- Aubrianna Younker
 - Explore research on why different patients would need to use this knee crutch device, making note of any specific human factors we should keep in mind when designing
 - Brainstorm 2 design ideas: 1 that improves the prototype the client currently has, and 1 that has its own new design
- Lauren Anderson
 - Continue researching why a patient may need to use a knee crutch to get up the stairs
 - Analyze how the product is currently used based on the client videos
 - Brainstorm design ideas
- Violet Urdahl
 - Create possible design ideas for project
 - Identify dimensions of product
 - Research physiological constraints involved in stair climbing
- Kayla Christy
 - Touch up my LabArchives
 - Start creating preliminary designs

- Research more standards for our product
- Evan Koelemay
 - Propose and finalize ideal size ranges for the prototype
 - Brainstorm ergonomic designs/materials for the handle.

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

Previous week's goals and accomplishments:

- Tess Fitzgerald
 - Attended advisor meeting and client meeting to prepare for the brainstorming process of fabrication
 - Researched demographic of user to better understand the necessary features and safety factors for the design
 - Wrote shelf life, ergonomics, and operating environment sections of PDS draft
- Aubrianna Younker

- Set up progress report 2 (9/12-9/18)
- Took notes during team meeting 2 on 9/12
- Engaged in a virtual meeting with our client, asking questions to give us a stronger understanding of the expectations for the project
- Looked at safety standards performance requirements for accessibility devices similar to the knee crutch to put in our PDS
- Lauren Anderson
 - Wrote the quantity and the target product cost
 - Participated in a zoom meeting with our client in order to better understand the specifications of the project
 - Started to research the biological concerns that are associated with our project and why a patient would need to use a knee crutch
- Violet Urdahl
 - Created PDS draft
 - Wrote function and client requirements portion of PDS
 - Began research on anthropometric tables to integrate into design dimensions
- Evan Koelemay
 - Participated in advisor meeting where we received suggestions on how best to proceed with the design process
 - Looked into standard stair and leg measurements to get a ballpark on the ideal size of the foot and the range of heights for the leg
- Kayla Christy
 - Went to the first BSAC meeting.
 - Worked on PDS draft and completed my portions
 - Started doing research on other competing designs.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Violet Urdahl	9/17/2025	Drafted PDS, met with team, and conducted research	2	2	4
Aubrianna Younker	9/16/2025	Worked on team documents such as the progress report, meeting notes, and PDS. Researched material for the PDS.	2.5h	2.5h	4h
Lauren Anderson	9/17/25	Met with team, conducted research, and continued to draft our PDS	2	2	3.5
Tess Fitzgerald	9/17/2025	Organized advisor meeting, continue individual research, drafted PDS	2	2	4

Evan Koelemay	9/17/2025	Met with team, worked on PDS, and conducted research	2	2	3.5
Kayla Christy	09/17/25	Met with the team, BSAC meeting, Worked on PDS	2	2	4