

Knee Crutch

Progress Report #3

BME Design 200/300

Date: 9/18-9/24

Client: Daniel Kutschera

Advisor: Duc-Huy Nguyen

Team:

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Problem statement

Patients who are non-weightbearing on a lower limb often have difficulty safely navigating stairs when returning home, particularly when weakness or other physical limitations prevent them from using crutches. Current solutions are either improvised, uncomfortable, difficult to adjust, or designed for walking rather than stair navigation. Therefore, there is a need for a stable, adjustable, comfortable, and easily sanitized device that allows non-weightbearing patients to safely ascend and descend stairs without placing weight on the injured lower limb.

Brief status update

This week we finalized three designs to be able to weigh in our design matrix. We went with these designs because they best fit our clients needs and wants for the outcome of this project. We then weighed them using a matrix and selected the “Light Step” as our final design. We finished up the design matrix report and continued researching

Difficulties / advice requests

We are trying to nail down a material to finalize for the base of our design. In our advisor meeting we will ask his opinion on the tentative material we have chosen.

Current design

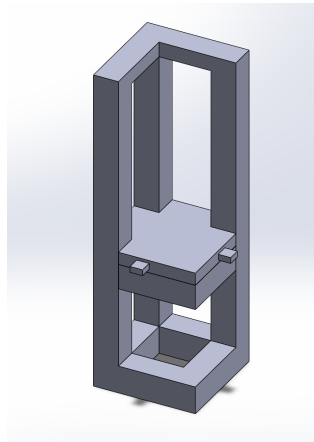


Figure 2: Isometric View of the Removable Stacking Plates Knee Crutch

This design consists of 2in x 2in aluminum bars that form a 9in x 9in horizontal square. From three vertices of the base square extends vertical 2in x 2in aluminum bars. The bars extend 23 inches from the floor and terminate with two connecting horizontal bars that provide structural support and function as handles for ease of movement. Foam casings will be added to these bars for comfort. A permanent 9in x 9in plate is placed 10.5in from the ground to act as a starting point for the adjustable height component of the product. A cushion is attached to the top of the plate, and during use, the knee is placed on top of the cushion. To adjust the height of the plate and its cushion, additional 9in x 9in x 1in plates may be added on top of the permanent plate. The plates include small tabs for ease of removal.

Materials and expenses

Item	Description	Manufactur- er	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. Create a preliminary presentation
2. Meet and practice our presentation so we will be able to present smoothly

Next week's individual goals

- Carmen Tanem
 - Work on the preliminary presentation
 - Start the preliminary report
 - Nail down material choice for base
 - Continue researching
 - Update PDS with design changes and advisor feedback
- Katie Matheus
 - Work on the preliminary presentation
 - Start the preliminary report
- Meghan Hayes
 - Work on the preliminary presentation
 - Email client with any questions
- Madeline
 - Work on material research & planning for design
 - Work on preliminary presentation
- Zach
 - Work on research for preliminary design
 - Work on preliminary presentation

- Search for sources of materials and components for purchases
- Victoria
 - Work on preliminary presentation
 - Continue researching materials

Timeline

Task	N/A	Sept				Oct					Nov				Dec	
	N/A	3	10	17	24	1	8	15	22	29	5	12	19	26	10	17
Project R&D																
Empathize																
Background...																
Prototyping																
Testings																
Deliverables																
Progress Reports		X	X	X												
Prelim presentation																
Final Poster																
Meetings																
Client		X														
Advisor		X	X	X												
Website																
Update		X	X	X												

Filled boxes = projected timeline

X = task was worked on or completed

Detailed accomplishments

Previous week's goals and accomplishments

- Carmen Tanem
 - Come up with a few design ideas to bring to advisor and client meetings
 - Research materials that we could use that fit clients needs
 - Update PDS to keep it up to date with changing client needs
- Katie Matheus
 - Researched biomechanics, handle cushion ideas, and a competing design for adjustability
 - Brainstormed design ideas and completed a design matrix
- Meghan Hayes
 - Researched potential materials and similar designs
 - Created SolidWorks drawing of design idea
- Madeline

- Begin early design brainstorming
- weigh pros and cons of existing designs on the market
- research ways to lower design weight
- Zach
 - Created Onshape drawing and description of preliminary design concept
 - Completed design matrix and selected preliminary design with team
 - Researched certain biomechanics and materials topics that will help with preliminary design
- Victoria
 - Researched Aluminum Standards
 - Researched causes of back strain and statistics regarding back strain
 - Completed design matrix

Summary of Team Accomplishments

1. We all brainstormed design ideas
2. We met on Monday/Tuesday night and went through the design matrix and picked the final design we will go with.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Carmen Tanem	9/18/26 9/23/26 9/24/26	Brainstormed design ideas Worked on Design Matrix Research material choice,	0.5 2 2	4.5	9
Katie Matheus	9/18/26 9/23/26 9/24/26	Brainstormed design ideas and handle ideas Worked on Design Matrix Research biomechanics, competing design	1 1 2	4	8.5
Meghan	9/18/26 9/20/26 9/24/26	Brainstormed ideas and reviewed last year's product Made SolidWorks drawing Researched potential materials and competing designs	1 2 2	5	9
Victoria	9/23/26 9/24/26 9/24/26	Worked on Preliminary Design Matrix Researched Aluminum Standards Researched Lower back pain	1 1.5 1.5	4	8.5
Madeline	9/18/26 9/20/26 9/23/26	Brainstormed design ideas Made SolidWorks Drawing worked on preliminary design matrix	1 2 1	4	8
Zach	9/18/26 9/21/26 9/24/26	Brainstormed design ideas Created CAD drawing of preliminary design Worked on preliminary design matrix	1 2 1	6	10

		Researched biomechanics, potential materials	2		
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