34Knee Crutch

Progress Report #11

BME Design 200/300

Date: 11/13-11/19

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.

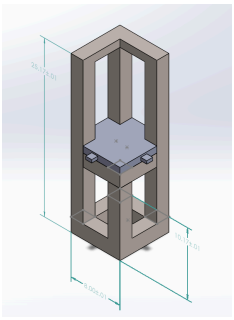
Brief status update

This week our team members finished welding the frame and 3D printed parts. We finished physical testing, using weights to test the limit of the frame and removable 3D plates.

Difficulties / advice requests

Should we have any sort of backup plan in case our design fails (due to connections) in testing?

Current design



Materials and expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
Al H-Beams	3ft long aluminum h beams; thickness: 0.05in; height: 1.074in; width: 1.040in	Unknown	Unknown	McMaster	4558t51	10/15/26	6	$10.60	$79.33	https://www.mcmaster.com/4558T51/
Category 2										
Knee cushion	knee cushion	etsy	-	etsy	-	10/21	2	14.76	$14.76	
Knee Cushion	Knee cushion upcharge	etsy	-	etsy	-	11/6		$6.00	$6.00	
Wraparound Grip	Pack of 3, 3 ft. long grips made of polyurethane-coated nylon fabric	-	-	McMaster	32765K211	11/19	2	$12.09	$36.13	McMaster-Carr

								TOTAL:	**$136.2**	

Goals

Major team goals for the next week

1. Order cushion stuffing
2. Stimulation testing
3. Incorporate statistics for testing
4. Start report and poster presentation

Next week's individual goals

- Carmen Tanem
    - Finish my parts of report sections
    - finish testing
    - Finalize testing
- Katie Matheus
    - Begin report sections
    - Begin poster sections
    - Put on the handle wrappings
    - Weight the new and old knee crutch prototypes with a scale
- Meghan Hayes
    - Work on final report
    - Work on final poster
- Madeline
    - Begin poster sections
    - Begin report sections
    - Aid in physical testing
- Zach
    - Work on Final Poster
    - Work on Final Report
    - Print additional needed plates
- Victoria
    - Work on Final Poster
    - Work on Final Report
    - Complete additional Testing

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			X													
Background…			X	X	X											
Prototyping				X	X	X	X	X	X	X	X	X	X			
Testings													X			
Deliverables																
Progress Reports		X	X	X	X	X	X	X	X	X	X	X	X			
Prelim presentation						X										
Final Poster																
Meetings																
Client		X														
Advisor		X	X	X	X	X	X	X	X		X	X				
Website		X	X	X	X	X	X	X	X	X	X	X	X			
Update		X	X	X	X	X	X	X	X	X	X	X	X			

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

Detailed accomplishments

Previous week's goals and accomplishments

- Carmen Tanem
  - Finish fabricating the metal base
  - Obtain the cushion
  - Start on the final deliverables
- Katie Matheus
  - Test the knee crutch with weights
  - Print plates
  - Order handles
- Meghan Hayes
  - Assist in the welding process
  - Start on final deliverables
- Madeline
  - Measure and begin making printed plates
  - Aid in early testing
- Zach
  - CAD and fabrication of 3d printed plates
  - Determine where we can access certain tools required for later testing
  - Print and test 3d printed plates

- Victoria
    - Work on different testing possibilities
    - Complete Fabrication

Summary of Team Accomplishments

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Carmen Tanem	11/18 11/19	Assist in welding process Weight testing	2 2	4	34
Katie Matheus	11/19	Order handle grips, update material expenses Weight testing with Carmen	3	3	30.5
Meghan	11/18	Assist in welding process	2	2	32
Victoria	11/19	Work on testing possibilities	1.5	1.5	33.5
Madeline	11/15 11/16	make potential plate stl designs meeting with Zach to discuss plate fabrication	1 1	2	31
Zach	11/15 11/16	CAD 3d printed spacer plates Meet with Maddie; refine CAD and print plates	1.5 1.5	3	33