

## **Knee Crutch**

**Date:** 10/16/25

**Client:** Daniel Kutschera

**Advisor:** Randy Bartels

### **Team:**

Violet Urdahl - Team Leader ([vurdahl@wisc.edu](mailto:vurdahl@wisc.edu))

Tess Fitzgerald - Communicator ([tkfitzgerald@wisc.edu](mailto:tkfitzgerald@wisc.edu))

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### **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.

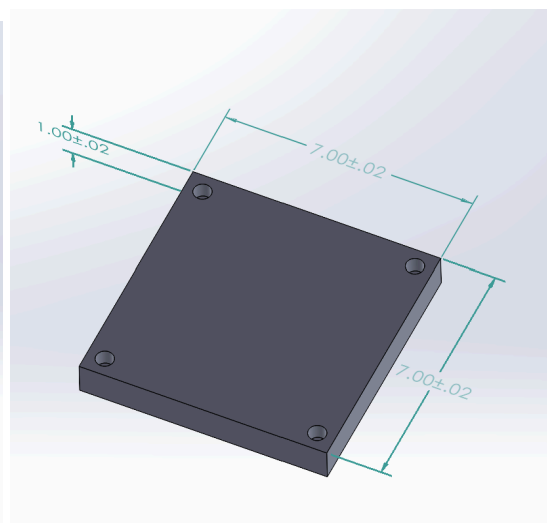
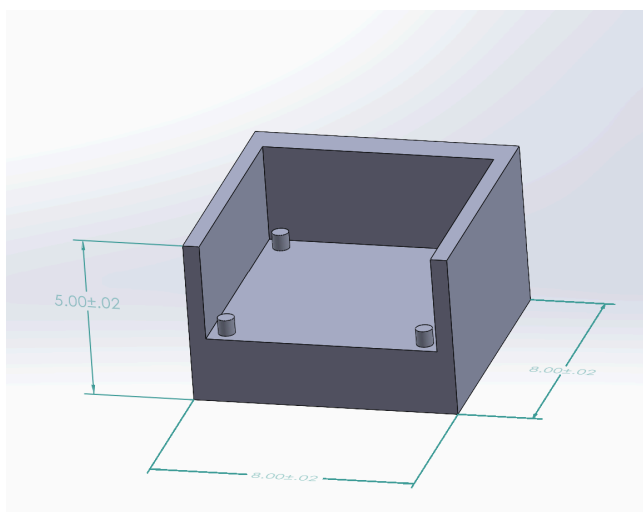
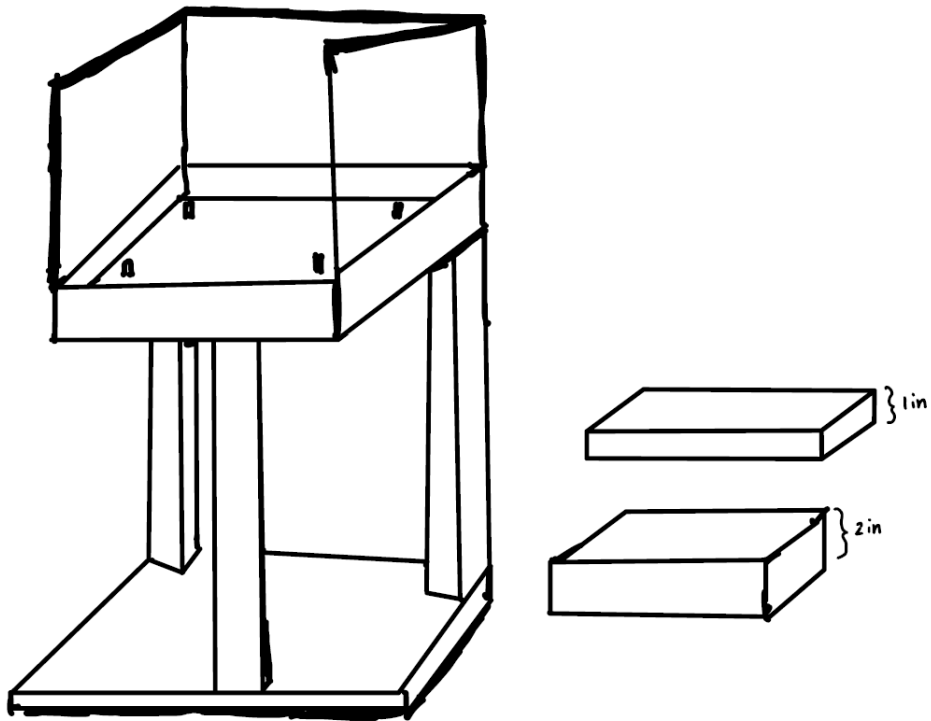
### **Brief Status Update:**

This week, the team focused on material decisions, finalizing design ideas, and budgeting. We were able to discuss with our advisor and client how to handle purchasing materials and reimbursements. With that set in stone now, we have the chance to begin ordering materials. It was decided that we will be ordering an extruded aluminum kit with connectors from Grainger in order to create our base. In addition to this decision, as a team, we were able to work out any kinks in our preliminary design idea and decide on the final dimensions of our prototype. This puts us in a good position to begin fabrication later next week.

### **Project Difficulties/Advice Requests:**

- None to report

## Current Design:



### 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 | Grainger     | Have not purchased | N/A | N/A           | \$0.00        |      |
| Memory foam cushion                   | Material for knee to rest directly on    |              | Have not purchased | N/A | N/A           | \$0.00        |      |
| Rubber base                           | Material for non-slip bottom base        |              | Have not purchased | N/A | N/A           | \$0.00        |      |
|                                       |                                          |              |                    |     | <b>TOTAL:</b> | <b>\$0.00</b> |      |

### Team Goals for Upcoming Week:

- Ensure the team notebook is up to date with deliverables, research, and documentation
- Place order for materials and begin assembling the base of the crutch
- Decide on a modified design for the handle of the crutch

### Individual Goals for Upcoming Week:

- Tess Fitzgerald
  - Order materials for base and legs
  - Begin fabricating prototype
- Aubrianna Younker
  - Order materials for base: extruded aluminum kit from Grainger
  - Continue research on handle materials and fabrication, and narrow down a manufacturer to order from
  - Update and add BPAG expense sheet to Lab Archives
- Lauren Anderson
  - Order materials

- Violet Urdahl
  - Order base materials
  - Begin base fabrication
  - Research materials for other components of design
- Kayla Christy
  - Continue to do research on our handle component of our design
  - Research materials for the handle and its comfortability
  - Complete Mill and Lathe trainings
  - Work on Chemical and Biosafety trainings
  - BSAC meeting
  - Begin fabrication
- Evan Koelemay
  - Begin fabrication of the base and framework of the design
  - Use base dimensions to finalize designs of other components

## 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  |    |          |   |    |    |    |          |    |
| PDS Draft                 |           |    | X  |    |         |    |    |    |          |   |    |    |    |          |    |
| Design Matrix             |           |    |    | X  |         |    |    |    |          |   |    |    |    |          |    |
| Preliminary Presentations |           |    |    |    | X       |    |    |    |          |   |    |    |    |          |    |
| Preliminary Lab Notebook  |           |    |    |    |         |    |    |    |          |   |    |    |    |          |    |
| 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 |  |  |  |  |  |  |  |  |
| Client  | X |   |   | X |   | X |   |  |  |  |  |  |  |  |  |
| Advisor |   |   | X |   | X |   | X |  |  |  |  |  |  |  |  |
| Website |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |
| Update  | X | X | X | X | X | X | X |  |  |  |  |  |  |  |  |

### Previous week's goals and accomplishments:

- Tess Fitzgerald
  - Met with team to discuss final alterations to device
  - Sourced material for rubber feet of prototype
- Aubrianna Younker
  - Contributed to a key design idea modification while experimenting with the old prototype
  - Researched/looked into different types of connectors for extruded aluminum rods
  - Created group progress report
- Lauren Anderson
  - Met with the team to discuss design changes and finalize the dimensions
  - Researched the importance of an aluminum rod kit and the compatibility of different parts
  - Tested the old prototype in order to understand the issues with it
- Violet Urdahl
  - Modified current design and settled on design dimensions for base
  - Researched testing methods
- Evan Koelemay
  - Completed online training
  - Researched materials used in walker handles
- Kayla Christy
  - I completed the online Mill and Lathe training portion
  - Attended meeting on Monday and started thinking about the handle component of our design
  - Set up my LabNotebook for research entries I plan on doing
  - Did testing on an old prototype to make improvements or adjustments to our design.

### Activities

| Name              | Date       | Activity                                                       | Time (h) | Week Total (h) | Sem. Total (h) |
|-------------------|------------|----------------------------------------------------------------|----------|----------------|----------------|
| Violet Urdahl     | 10/12/25   | Researched testing methods and materials for base              | 2        | 2              | 14.5           |
| Aubrianna Younker | 10/15/25   | Research, design considerations, and budgeting                 | 1.5h     | 1.5h           | 15h            |
| Tess Fitzgerald   | 10/15/2025 | Material research, design considerations, budgeting            | 1hr      | 1hr            | 14hrs          |
| Lauren Anderson   | 10/16/2025 | Research, design ideas                                         | 1 hr     |                | 13.5h          |
| Evan Koelemay     | 10/16/2025 | Research, training                                             | 1.5h     | 1h             | 13h            |
| Kayla Christy     | 10/16/25   | Online trainings, Design considerations, Research on materials | 2.5      | 2.5            | 16.0           |
| Whole Team        | 10/13/25   | Fabrication plans, material choices, and budget                | 1h       | 2h             | 11.5h          |
| Whole Team        | 10/10/25   | Advisor Meeting                                                | 1h       |                |                |