

# Functional Model for Reduction of Pediatric Radial Head Subluxation

[Team Website Link](#)

Date: September 24th, 2026 - October 1st, 2026

Client: Dr. Carey Wagoner - [cwagoner@wisc.edu](mailto:cwagoner@wisc.edu)

Advisor: Dr. Melissa Skala

Team Members:

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## Problem statement

Radial head subluxation, commonly known as nursemaid's elbow, is a frequent pediatric injury predominantly in children ages 1-3 that requires proper manipulation of the elbow and forearm for successful reduction. Orthopedists must learn the two techniques for reducing nursemaid's elbow: hyperpronation and supination-flexion. Maneuvers such as these require appropriate positioning, rotation, and force to return the radial head to its normal position. However, opportunities to practice these methods are limited, which creates a need for a reusable pediatric elbow simulation model. The model should replicate the correct anatomical demographics, appropriate elbow biomechanics, and provide feedback, such as a "click," to help medical professionals safely and accurately practice the skills needed to reduce nursemaid's elbow.

## Brief status update

The team brainstormed some designs for the project and organized a design matrix for the top three ideas. The team has put together a preliminary presentation to discuss design ideas and receive feedback from peers and advisors. Additionally, Dr. Wagoner and the team met to discuss the final design and make improvements to start laying down a plan to fabricate. The team plans to begin ordering materials and fabricating in the coming weeks.

## Difficulties / advice requests

There are no difficulties at this time.

## Current design

The team plans to begin fabricating the Detent Arm Design.

## Materials and expenses

[illegible]

| Category 2 |  |  |  |  |  |  |               |               |  |
|------------|--|--|--|--|--|--|---------------|---------------|--|
|            |  |  |  |  |  |  |               | \$0.00        |  |
|            |  |  |  |  |  |  |               | \$0.00        |  |
|            |  |  |  |  |  |  | <b>TOTAL:</b> | <b>\$0.00</b> |  |

## Major team goals for the next week

1. Order any materials that cannot be purchased from the Makerspace.
2. Work on Preliminary Report
3. Begin prototyping the elbow model.
4. Schedule next meeting with Dr. Wagoner to receive feedback on the prototype.
5. Continue research to better understand designs and mechanisms.

## Next week's individual goals

- Siya Agarwal
  - Continue further into research on ways to fabricate detent mechanism, attachable piece, and reset mechanism
  - Start looking into materials to order for fabrication for detent mechanism
  - Use feedback from Preliminary Presentation to rework final design
  - Work on Report
- Maddie Kaltman
  - Conduct more research on the detent mechanism and reset mechanism
  - Look into 3D printing materials for bones
  - Incorporate feedback from Preliminary Presentation
  - Work on Preliminary Report
- Jacqueline Sceats
  - Determine and order materials for the detent mechanism in the elbow joint
  - Modify the CAD files for the humerus, radius, and ulna to accommodate the mechanism
  - Continue research for wrist joint and skin materials
- Addison Dowe
  - Continue researching what material should be used for the “skin” on the arm
  - Evaluate the preliminary presentation feedback and make changes to the design based on it
  - Start to build a CAD model for the full arm

- Jason Yang
  - Continue research
    - Research the existing product
    - Researching how to make a reliable ligament and possible materials.
    - Find more research to fill the knowledge gap on the elbow mechanisms
    - Continue working on polishing the designs.
- Dante Tripathi
  - Continue research for possible mechanisms that could be used
  - Continue working on preliminary design
  - Look into possible ways to fabricate and what might need to be bought

## *Timeline*

| Task                   | September |    |    |    | October |   |    |    |    | November |    |    |    | December |    |
|------------------------|-----------|----|----|----|---------|---|----|----|----|----------|----|----|----|----------|----|
|                        | 4         | 11 | 18 | 25 | 2       | 9 | 16 | 23 | 30 | 6        | 13 | 20 | 27 | 4        | 11 |
| <b>Project R&amp;D</b> |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Empathize              | X         | X  | X  |    |         |   |    |    |    |          |    |    |    |          |    |
| Background...          |           |    | X  | X  |         |   |    |    |    |          |    |    |    |          |    |
| Prototyping            |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Testings               |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| <b>Deliverables</b>    |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Progress Reports       | X         | X  | X  | X  |         |   |    |    |    |          |    |    |    |          |    |
| Prelim presentation    |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Final Poster           |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| <b>Meetings</b>        |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Client                 |           | X  |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Advisor                | X         | X  | X  | X  |         |   |    |    |    |          |    |    |    |          |    |
| <b>Website</b>         |           |    |    |    |         |   |    |    |    |          |    |    |    |          |    |
| Update                 | X         | X  | X  | X  |         |   |    |    |    |          |    |    |    |          |    |

Filled boxes = projected timeline

X = task was worked on or completed

## Previous week's goals and accomplishments

- Created a preliminary presentation to go over our initial design ideas and receive feedback.

## *Activities*

| Name              | Date         | Activity                                                                                                                                                                                                                                                                                                                        | Time (h)                                                                                           | Week Total (h) | Sem. Total (h) |
|-------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------|----------------|
| Siya Agarwal      | 9/24 - 10/01 | <ul style="list-style-type: none"> <li>- Worked on Preliminary Presentation</li> <li>- Dove further into research on detent mechanism, attachable piece, and reset mechanism,</li> <li>- Started looking into materials to order for fabrication</li> </ul>                                                                     | <ul style="list-style-type: none"> <li>- 1 hour</li> <li>- 1.5 hour</li> <li>- 0.5 hour</li> </ul> | 3 hours        | 14.5 hours     |
| Maddie Kaltman    | 9/24 - 10/01 | <ul style="list-style-type: none"> <li>- Worked on and practiced Preliminary Presentation</li> <li>- Conducted more research on mechanism</li> <li>- Drew out final design</li> </ul>                                                                                                                                           | <ul style="list-style-type: none"> <li>- 1 hour</li> <li>- 1 hour</li> <li>- 1 hour</li> </ul>     | 3 hours        | 12 hours       |
| Jacqueline Sceats | 9/24 - 10/1  | <ul style="list-style-type: none"> <li>- Researched the detent joint mechanism and worked on a more comprehensive design</li> <li>- Found 3D models and printed the humerus, radius, and ulna to use for the preliminary presentation</li> <li>- Worked on the preliminary presentation and continued doing research</li> </ul> | <ul style="list-style-type: none"> <li>- 2.5 hours</li> <li>- 1 hour</li> <li>- 1 hour</li> </ul>  | 4.5 hours      | 12.5 hours     |
| Addison Dowe      | 9/24 - 10/1  | <ul style="list-style-type: none"> <li>- Researched competing designs and materials</li> <li>- Attended the client meeting</li> <li>- Worked on preliminary presentation</li> </ul>                                                                                                                                             | <ul style="list-style-type: none"> <li>- 1.5</li> <li>- 1</li> <li>- 1</li> </ul>                  | 3.5            | 11 hours       |
| Dante Tripathi    | 9/24 - 10/01 | <ul style="list-style-type: none"> <li>- Researched more on the wrist movement</li> <li>- Fleshed out wrist design further</li> </ul>                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>-1 hr</li> <li>-1 hr</li> </ul>                             | 2 hr           | 10 hours       |

|            |              |                                                                                                                                                                                                                                                  |                                  |      |       |
|------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|-------|
| Jason Yang | 9/24 - 10/01 | <ul style="list-style-type: none"><li>- Researched possible materials for ligaments</li><li>- Working on the preliminary designs</li><li>- Working on preliminary design slide presentation.</li><li>- Researching on elbow mechanisms</li></ul> | 1 Hr<br>0.5 Hr<br>0.5 Hr<br>1 Hr | 3 Hr | 13 Hr |
|------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------|-------|