Functional Model for Reduction of Pediatric Radial Head Subluxation

Team Website Link

Date: October 23th, 2026 - October 29nd, 2026

Client: Dr. Carey Wagoner - 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

This week, the team printed and assembled the first prototype of the elbow. During that process and after assembly, the team made a list of the feedback received from the client and from the team discussion to make a plan for how to improve the model and incorporate all of the elements that are needed.

Difficulties / advice requests

There are no difficulties at this time.

Current Design

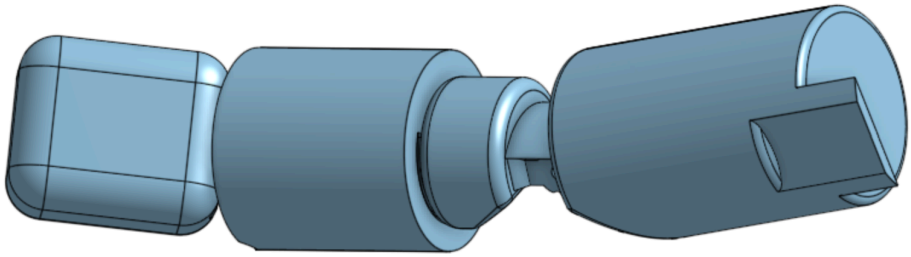


Figure 1. Detent Arm Design

Materials and Expenses

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	QTY	Cost Each	Total	Link
Mechanism										
Reset Mechanism	A detent pin reset mechanism	WHLLING	B0CWR9RSDC	Amazon	B0CWR9RSDC	10/2/2026	1	$9.99	$9.99	Link
Detent Ball	spring-loaded detent ball	Harfington	B0FRGDVB1M	Amazon	B0FRGDVB1M	10/2/2026	1	$7.19	$7.19	Link
Ball and Socket	self-lubricating ball join + rod-end fitting	uxcell	B0CT2GFR1D	Amazon	B0CT2GFR1D	10/2/2026	1	8.79	$8.79	Link
Screw Thread Ball Plunger 8x20 mm	Detent ball	Harfington		Amazon	hta250717hh000858 hta250717hh000886 3360A31, 3360A32 3126A28, 3126A114	10/19/2026	1	$7.19	$7.19	Link
Screw Thread Ball Plunger 12x20mm	Detent ball	Harfintion		Amazon	hta250717hh000858 hta250717hh000886 3360A31, 3360A32 3126A28, 3126A114	10/19/2026	1	$8.69	$8.69	Link
Hex Long-Nose Spring Plunger	Hex nose spring-loaded detent pin	McMaster	3126A28 3360A31	McMaster	hta250717hh000858 hta250717hh000886 3360A31, 3360A32 3126A28, 3126A114	10/19/2026	1	$5.84	$5.84	Link
Long-Nose Spring Plunger	Long nose spring-loaded detent pin	McMaster	3126A28 3360A31	McMaster	hta250717hh000858 hta250717hh000886 3360A31, 3360A32 3126A28, 3126A114	10/19/2026		$7.73	$7.73	Link

Skin/Muscles										
Platinum Cure Silicone	20 oz translucent silicon mold-making kit	Let's Resin	B07V5FFPWC	Amazon	B07V5FFPWC	10/2/2026	1	$17.69	$17.69	Link
Foam	Customizable foam sheet	Amgo	B0FFLGCTFK	Amazon	B0FFLGCTFK	10/2/2026	1	$14.00	$14.00	Link
								TOTAL:	**$87.11**	

Major team goals for the next week

1. Modify CAD based on feedback from Show and Tell
2. Meet with Jesse to clarify a few ideas about the prototype
3. Order any additional materials needed
4. Create testing plans
5. Design the stand and the skin components of the model

Next week's individual goals

- Siya Agarwal
  - Flesh out the cam mechanism for technique to not work unless near 90 degrees
  - Look into ordering the other materials for the prototype
  - Start machining and experimenting with the grooves for the detent mechanism
- Maddie Kaltman
  - Improve CAD model based on client feedback
  - Work on creating a design that doesn't work unless the elbow is at 90 degrees
  - Continue to research and meet with Jesse about testing detent grooves
- Jacqueline Sceats
  - Work on improving the CAD model based on feedback from team and feedback received during show and tell
  - Work on a design that prevents mechanism from working unless at 90 degrees
- Addison Dowe
  - Start fabricating the outer skin and muscle layers
  - Limit ability for mechanism to work within specific degrees of motion
  - Continue research on accuracy to feel
- Jason Yang
  - CAD modeling Arm Stand with relevant dimensions
  - Working on mechanism that only allows click when arm is raised at 90 degrees(hyperpronation)

- Dante Tripathi
    - Start testing and assembling the prototype
    - Come up with design changes for any problems encountered

Timeline

Task	September				October					November				December	
	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11
Project R&D															
Empathize	X	X	X												
Background			X	X	X	X	X	X							
Prototyping								X							
Testing															
Deliverables															
Progress Reports	X	X	X	X	X	X	X	X							
Prelim presentation					X										
Final Poster															
Meetings															
Client		X			X			X							
Advisor	X	X	X	X		X	X								
Website															
Update	X	X	X	X	X	X	X	X							

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

Previous week's goals and accomplishments

The team researched and found hardware for the model, finished modeling the full arm in Onshape, printed, and assembled the first prototype for show and tell.

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Siya Agarwal	10/23-10/29	- Researched set screw, mechanical button for tactile feedback, cam mechanism, and retractable pins and complied it in a document - Found materials for new mechanism for elbow - Meeting with Jacqueline and Maddie to assemble prototype - Team meeting to prepare for Show and Tell - Client Meeting	- 4 hours - 0.5 hour - 0.5 hour - 0.5 hour - 0.5 hour	6 hours	25 hours
Maddie Kaltman	10/23-10/29	- Worked on CAD model of arm - Meeting with Siya and Jacqueline to assemble prototype and brainstorm - Client meeting	- 2.5 hours - 1 hour - 0.5 hours	4 hour	22.5 hours
Jacqueline Sceats	10/23-10/29	- Researched sizing and hardware for model - Worked on full arm CAD model and 3D printed - Client meeting - Team meetings to fabricate and prepare for show and tell	- 1 hour - 5 hours - 0.5 hour - 1 hour	7.5 hours	25.5 hours
Addison Dowe	10/23-10/29	- Worked on full arm CAD model - Client meeting - Team meeting to prepare for show and tell	- 3 hour - 0.5 hour -0.5 hour	4 hours	22 hours
Dante Tripathi	10/23-10/29	- Researched other joint types - Prepared for show and tell - 3d printed CAD models	-30 min -1 hr	1.5 hours	17 hours

Jason Yang	10/23-10/29	- Practicing elevator pitch - Working on arm stand CAD	- 0.5 hour - 1hour	1.5 hours	18.5 Hr