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Patient Tracking and Following IV Pole

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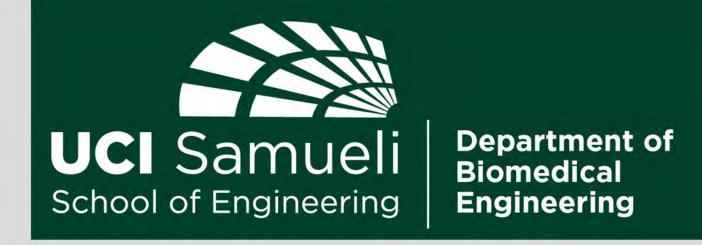
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Peer reviewed



Patient Tracking and Following IV Pole

CHOC Children's Health of Orange County

Team Kaillou: Ulysses Castillo, Leilany Lim, Isela Magallon, Amal Tabban, Katie Trimble Engineering Mentor: Dr. Christine King, PhD | Physican Mentor: Dr. Jacqueline Lee, MD

Project Goal

Ambulatory pediatric patients can spend long periods of time in hospitals and one of the biggest struggles is having to maneuver IV poles wherever they go. IV poles can be heavy because they hold multiple infusion pump systems, intravenous fluids (IV), total parenteral nutrition (TPN), and more. Pediatric patients typically rely on nurses and parents to help them move around. Team Kaillou is creating a new IV pole device that will track patients, follow them, and allow patients, nurses, and parents to intervene more infrequently. We hope our device can empower pediatric patients with a stronger sense of normalcy, mobility, and freedom back in their lives.



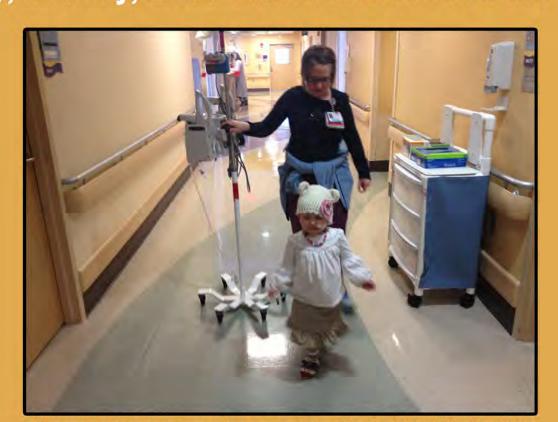


Figure 2: Parent pushes an IV pole behind their child

Our Team



Leilany Lim, Biomedical Engineering Team Lead



Ulysses Castillo, Biomedical Engineering Designer



Isela Magallon, Biomedical Engineering
Manufacturer



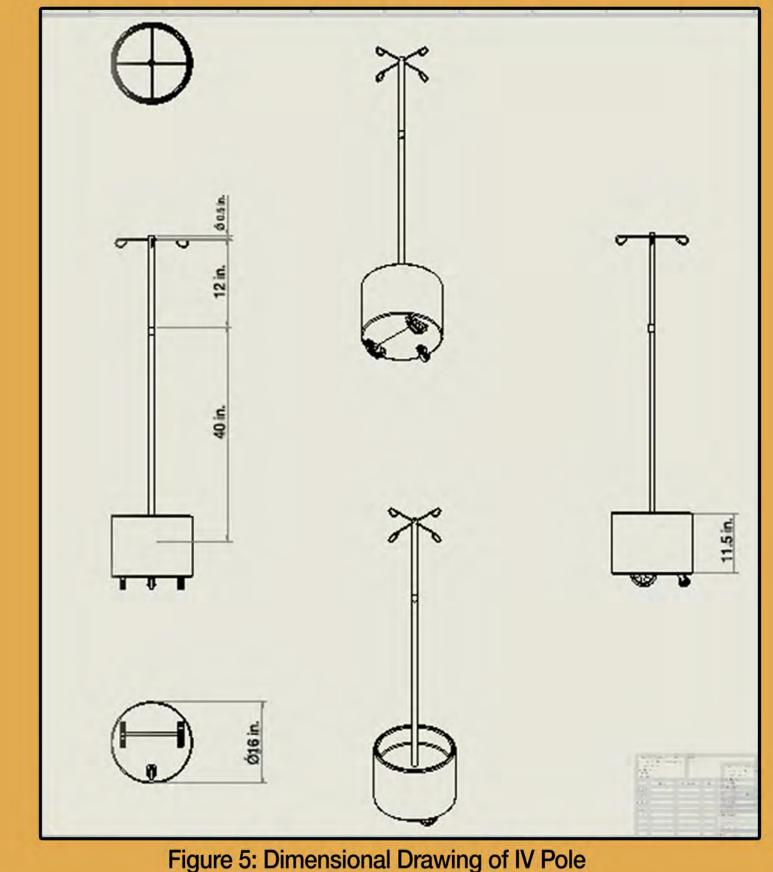
Amal Tabban, Biomedical Engineering Marketing Advisor



Katie Trimble, Biomedical Engineering
Minor: Innovation and Entreprenuership
Business Advisor

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Our Design Four hooks Adjustable IV pole length Built-in hooks to hold additional IV tubing Base has built-in storage for personal belongings and additional equipment Hardware inside includes ultrasonic and infared sensors to track patients 2 motorized wheels and 1 caster wheel Figure 3: Front View of our IV pole CAD design Figure 4: Bottom View of our IV pole CAD design



Verification/Validation Plans

ID	User Need	Design Input [2]	Design Output Design Verification 21 CFR 820.30(f)		Design Validation 21 CFR 820.30(g)			
1	Patients need to be	The device must consistently stay 20 in. away from the patient when operating.	The device has 8 IR sensors, 4 ultrasonic sensors, and 2 motors to track the patient. This is in the Bill of Materials and design drawings.	Field Testing, dimensional inspection, analysis of consistent distance from user, inspection of assembly	System and functional validation User feedback after Human Factors critical tasks activities, n1= 10 children, n2=30 nurses/hospital staff and n3=10 parents with small children			
2	able to walk freely without manually maneuvering the device. [1]	The device must rotate in increments of 30 degrees until obstacles are more than 8 in. away.	The device has ultrasonic sensors to detect obstacles. This is in the Bill of Materials and design drawings.	Field Testing, dimensional inspection, analysis of consistent distance from user				
3		The device must fit through a 36 in. x 100 in. doorway	The device has a 16 in. diameter base and a height range of 48-96 in. This is in the design drawings.	Dimensional inspection, inspection of assembly	Patient and nurse feedback			
4	The device needs to appeal to pediatric patients.[1]	The device must be decorated to appeal to children.	The device has stickers on the base. This is in the Bill of Materials and design drawings.	Dimensional inspection	Patient feedback, n=20			
5	Nurses need to be able to troubleshoot	The device must have an off and on switch on the base of the device, with a green light indicating when the device is on.	The device will have an on and off switch and green light. This is in the Bill of Materials and design drawings.	Inspection of circuit, inspection of assembly, testing of switch	System and functional validation and user feedback, n1= 10			
	the device if the device stops moving or needs to be	The device must have a red reset button on the base of the device.	The device will have a red-coated reset button. This is in the Bill of Materials and design drawings.	Testing of reset button, inspection of circuit	children, n2=30 nurses/hospital staff and n3=10 parents with sma			
7	reset.[1]	The device must visually communicate what mode it is currently in.	The device will have an LCD screen. This is in the design drawings and bill of materials.	Testing of LCD screen, inspection of circuit	ormateri			
8	End users need to be able to switch the	The device must switch to a manual mode when a specific tension is detected by the device.	The device will have a cable with a tension meter. This is in the bill of materials and design drawings.	Pole pull force test and accuracy analysis of tension	User feedback, n1= 10 children, n2=30 nurses/hospital staff and n3=10 parents with small children			
9 m	mode in the case of a safety emergency or	The device must have a switch at the top of the base of the device to switch between the manual and hands-free mode.	The device will have a switch with manual and hands-free labels. This is in the Bill of Materials and design drawings.	Testing of switch, inspection of circuit				
	the device to be in manual mode. [2]	The device must have instructions to follow for operating and troubleshooting.	The device will have an instruction manual for operation, safety features, and troubleshooting.	Analysis of the tasks in the manual for human factors	User feedback collected after Human Factors tasks activities, n=20			

Project Timeline

WBS		START DATE	DUE DATE	DURATION	PCT OF	PHASE THREE											
#	TASK TITLE				TASK COMPLETE	Ma		1	Apr	il				May	1	10	June
3	Spring Quarter							Ė					Ť				
3.1	Protyping II	1/27/23	3/17/23	5	50%												
3.2	Testing	2/16/23	4/1/23	8	0%												
3.3	Design Revision and Prototyping	3/17/23	4/14/23	4	0%												
3.4	Finalized Device	4/14/23	5/20/23	7	0%												
3.5	Finalized Presentation	5/4/23	6/2/23	6	0%												
3.6	Stella Zhang New Venture Competition Finale	6/3/23	6/3/23	1	0%												

Works Cited

