

Team Xavier

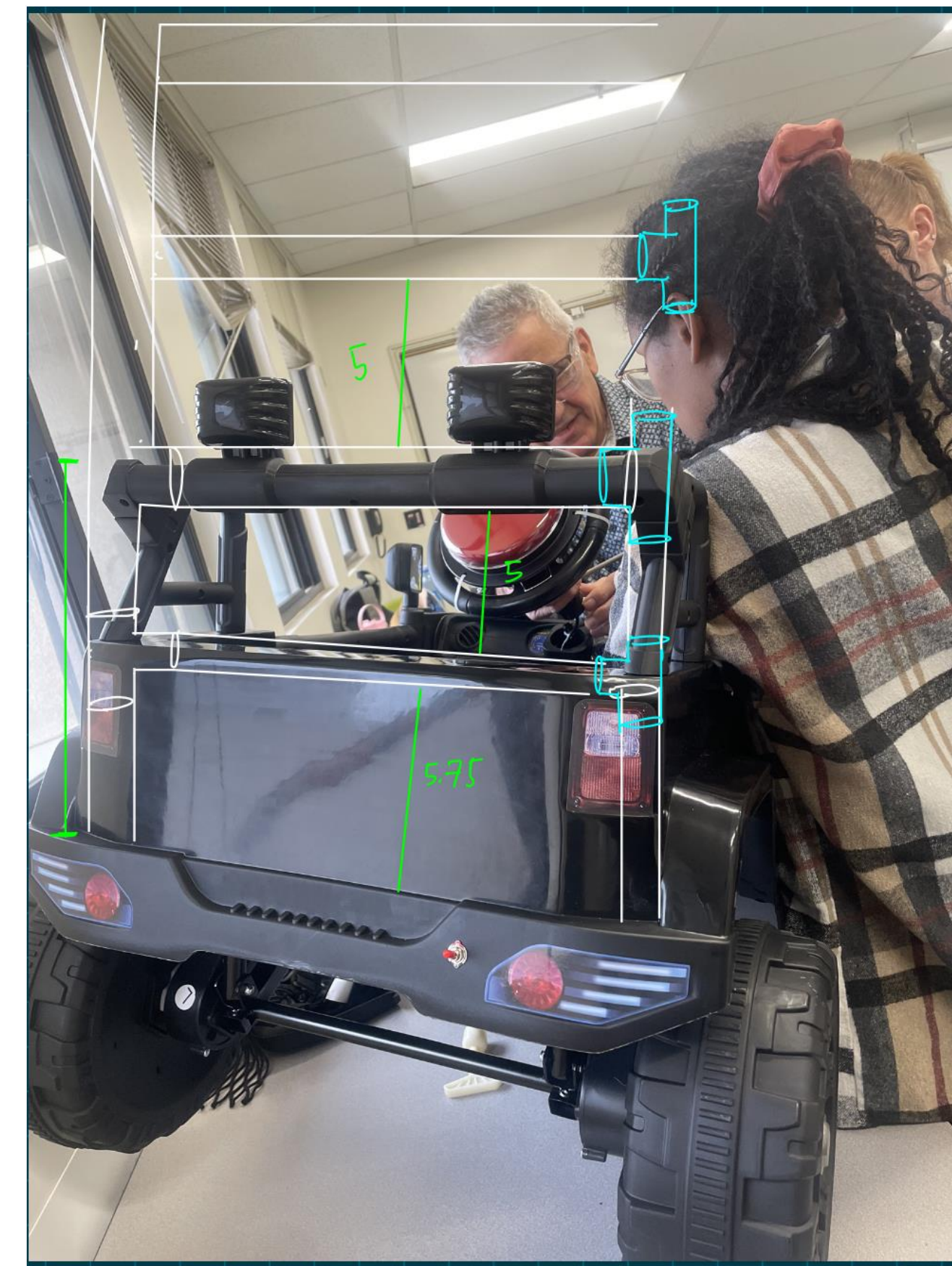
Kristina Davtyan, Eden Amanios, Ara Hadjian, Syuzanna Abrahamyan, Shyamini Rivera

Go Baby Go! Team Internship



INTRODUCTION

Our research centers on the modification of a mini ride-on car for our client Xavier, a 3-year-old boy diagnosed with Spastic Tetraplegia Cerebral Palsy. Xavier is the oldest child with one younger sister and two parents. He suffers from a mobility disorder that affects his ability to move independently. Aside from his condition, Xavier is known to be a very happy child, who enjoys spending time outdoors with his family and playing with his sister. Xavier is a very active boy and loves to explore and move. According to his mom, he enjoys walking, hiking, and playing in the park. Xavier also likes watching *Pocoyo*, his favorite cartoon show.



CHALLENGES

The length of the internship is 10 weeks, and throughout those 10 weeks we faced an array of challenges. One of the major challenges we faced came to designing the specific modifications we desired to apply to the car. We conducted an interview with Xavier's mother to get a better understanding of Xavier's needs and wants, and what would best fit the family's lifestyle. An important detail mentioned was the relationship between Xavier and his little sister. The incorporation of her in this new addition to his life was important, so we opted in creating telescopic PVC handlebar that will be able to reach her height, and extend to an adult's height, to be able to push him with the car off. We went through multiple versions of design, considering the weight of Xavier, the weight of the modifications, and how it would affect the stability of the car. After we collectively agreed on a design, the mechanics of the design now had to be considered. It quickly became apparent that the resultant force from the PVC pieces being drilled into the car and the thickness and structure of the car would compromise the safety of the car and the child. In that moment, we unfortunately had to abandon our design. We shifted our focus on the exterior design and the building of the car.

OBJECTIVE

Xavier is diagnosed with Spastic Tetraplegia Cerebral Palsy. This form of Cerebral Palsy affects both the arms and legs and often the torso. Xavier spends his time in a special stroller due to the lack of movement in his legs. The disorder affects his reflexes with his arms/hands and relates to muscles in his neck, this is called Asymmetric Tonic Neck Reflex. Sudden movements can cause muscle spasms and stiffness, that can be difficult to relax.

With a better understanding of his disorder, we were able to create a vision of a modified car that will best fulfill his needs. From the limited leg movements, we chose a car that is a larger size to avoid restriction in sudden movements. Xavier being a curious child that enjoys exploring his environment, we collectively decided to focus on providing support to his trunk (upper body) so that he has the freedom to do minor stretching around the neck that will correct spasms/stiffness. We opted for a sensor button to help with navigating the car and to relieve the additional strain that can be added to his arms and hands. Finally, we modified the car's remote so that it would override the car's system. The modifications include a kill switch and to take control over the car's movements to assure the remote's user full control over Xavier's safety.



MATERIALS

- PVC pipes
- 6V ride-on car
- Push button
- Toggle switch
- Swim kickboard for support
- Foam pool noodles for protection
- Screws and wiring
- Decal stickers for 3-D printed License plate



RESULTS

When presenting the car to Xavier, we had to add minor pieces to ensure a more personalized fit. Xavier leans naturally more to the right, so we had to add 2 bent and taped pool noodles to both of his sides in the car to avoid over-leaning on one side. Due to his size, we noticed that he also struggled to push the button frequently/prolonged time, which led to the taping all the addition color button options together then to the main one on the car. This instantly showed success with Xavier being able to reach and hold down without overstretching his arms and hands. Apart from his happy reaction, we saw more effort to hold his head up on his own. The ability to hold his head shows the possibility of strength and movement to come as he grows.



ACKNOWLEDGMENTS

Dr. Cole Galloway – Founder of Go Baby Go!
Stephanie Yu – Physical Therapist, Founder of Go Baby Go! Los Angeles
Jason Nadeau- Physical Therapist
Rachel Ridgway- Professor, GCC Go Baby Go! Coach
Nareh Manooki - Professor, GCC Go Baby Go! Coach
Christopher Herwerth - Professor, GCC Go Baby Go! Coach
Office for Hispanic-Serving Initiatives and jointly funded by the Adelante GCC (Title V, Part A) and Bien in STEM (Title III, Part F) federal HSI grants.

