Go Baby Go-D
Team 9

Senior Year Project (2016-2017)

NORTHERN ARIZONA UNIVERSITY

College of Engineering, Forestry & Natural Sciences

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1. Disclaimer

This manual was prepared by students as part of a university course requirement. While considerable effort has been put into the project, it is not the work of licensed engineers and has not undergone the extensive verification that is common in the profession. The information, data, conclusions, and content of this report should not be relied on or utilized without thorough, independent testing and verification. University faculty members may have been associated with this project as advisors, sponsors, or course instructors, but as such they are not responsible for the accuracy of results or conclusions.

2. Background

Children with limited mobility often do not receive the much-needed exposure to socialization to cognitively develop at a normal rate. Existing research showed that equipping young children with a capacity for self-control over their own environment can have a meaningful impact on the long term outcomes of impairments such as cerebral palsy or muscular dystrophy. The GBG project, which began at the University of Delaware, has developed a set of DIY cars for families with children who suffer from mobility restrictions. These cars have been designed on commercially available ride-on toy car platforms (like Power Wheels) and have been deployed worldwide by the GBG team. These cars have proven to be a cost-effective means of enabling young children to move and interact with their peers. The goal of this project was to design and build a new version of the GBG retrofits – specifically, to design a universal control for children with extremely limited mobility of their body except their hands.

3. Overview

This guide book shows the Go Baby Go –D Team 9 device maintenance and the operation of the electric scooot design. Costumers are welcome to visit the team's website for more background information and the team experiences during the project process:
https://www.cefns.nau.edu/capstone/projects/ME/2017/GoBabyGoD/

4. Electric Scooot Manufacturing

This section explains how to build the electric scooot with all the materials that shown in table 1 in the appendix. Noodle foam, sponge sheets, fabric sheets covered every sharp edge parts and padding sheets. Whereas, split loom covered the wires. The design is under two main categories the structural base and the subsystems.

4.1. The Structural Base

In this, part the user will need help from professionals in welding and drilling.

a. Weld four pieces of plain steel 36in back beam 36.5in both left and right side beams18.5in

front beam to create a rectangular base frame shows in figure (1).

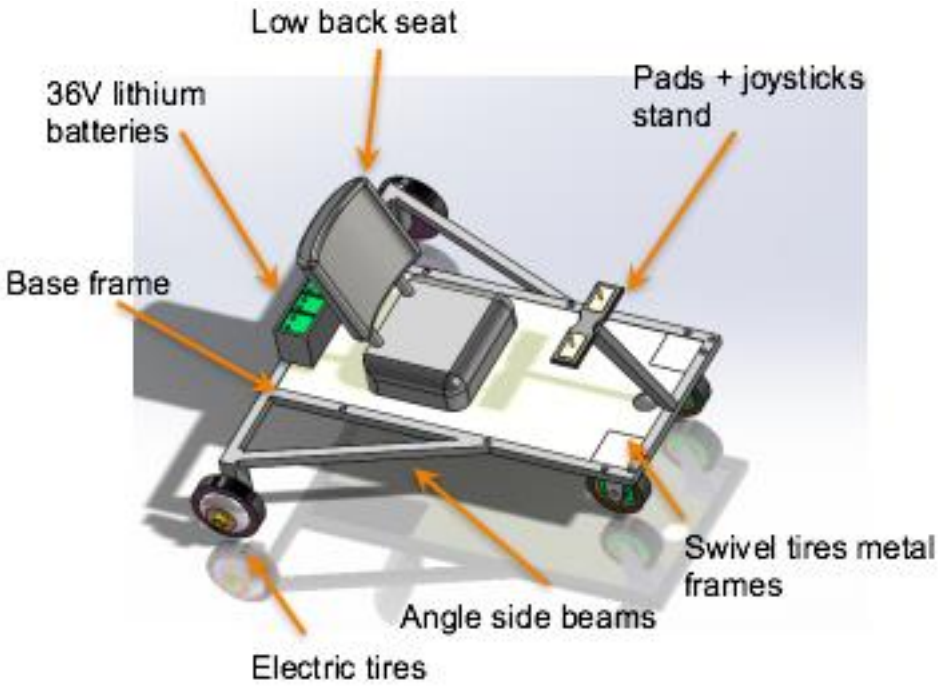

Figure 1 Overall CAD Design Explanation

Figure 2 U-bolts

b. Drill holes in the base frame for screws to attach the 36in height 18in width wood board. In the front of the wood board cut a rectangle shape 3in height 4in width from both left and right side for the swivel tires shows in figure (1).
c. Weld two pieces of plain steel square 24in on each side of the Base frame to create an angle side beam shape shows in figure (1). Weld the pieces start from under the end of the longest plain steel in the base frame.
d. Below the angle side beams weld ½ in U-bolts to support the electric tires from any damage shows in figure (2).
e. Pads-joysticks stand 45 degrees down: weld two pieces of 14.5 in plain steel square to the middle point of the front base frame beam shows in figure (1). And attach two pieces of 1in square shape flat steel sheet to support the stand first, 3in from the bottom second, 7in from the first square sheet that shows in figure (3).
f. Weld 1in plain steel square to the stand from the top in a vertical way shows in figure (3).

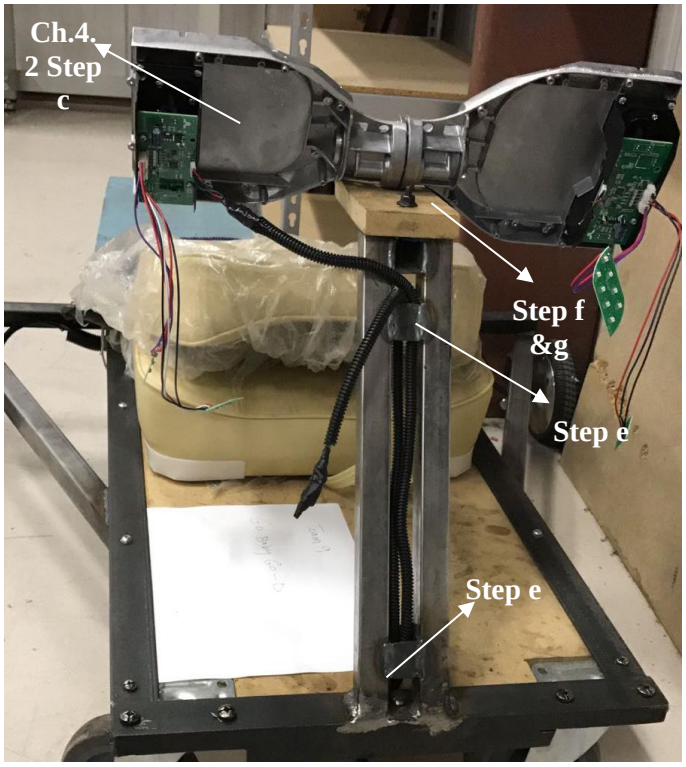

Figure 3 Close look to the design 1

g. Attach 6in height 3in width wood board piece on the top of step (f) with screws shows in figure (3).
h. Weld 6.5in height 10in width plain steel to create rectangle boundaries for the batteries location. The boundaries stars from the inside left side of the base frame beam and the inside back base frame beam.

4.2. The Subsystems

This section explains the subsystems and their position. Every electrical part took from the hover board.

a. Locate both electric tires inside the U-bolts and swivel tires using the metal attachment that comes with it in the front wood board cuts that discussed in chapter 4.1 step (b) and shows in figure (2).
b. Place the motherboard bellow the design near the left side of the electric scooot within 2in space from the base frame shows in figure (4). Use the extension wires to attach both electric tires to the motherboard that already attached in both pieces.
c. Use 55in wire extension shows in figure (5) to connect the motherboard all the way to the pads-joysticks electric boards. Place the electric pads-joysticks boards under the hover board metal base shows in figure (3).

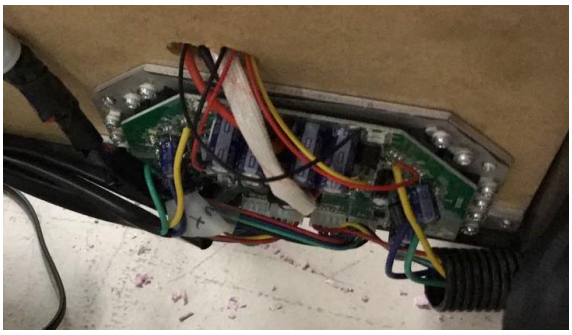

Figure 4 Motherboard

i. Place the hover board case in the top of step (g)in chapter 4.1 using tighten robs from each side in the middle of hover board case.
d. Locate the low back seat on the wood board and tight it 15.5in height from the front beam and 2in width from the side frame beams shows in figure (1).
e. Connect the last wire extension of the mother board to the batteries and locate them safely.
f. Attach the safety belt 1in the rectangle back base frame beam shows in figure (6).

Figure 5 Wire extension

Figure 6 Safety belt

5. Electric Scooot Operation

This section explains how to operate the device by following the steps below:

a. Make sure the batteries are fully charged. The charging device will notify the user if the battery is fully charged by showing two different lights on (Orange = Battery is empty, Green = Fully charged)

b. The device turned on by using the remote start button that is placed underneath the device.

- To turn right press the right pressure pad with twist of -%5 only
- To turn left press the left pressure pad with twist of -%5 only
- To move forward push the pressure pad and let the pressure pad twist -5%
- To move backward push the pressure pad and let the pressure pad twist +5%

6. 3D CAD Design

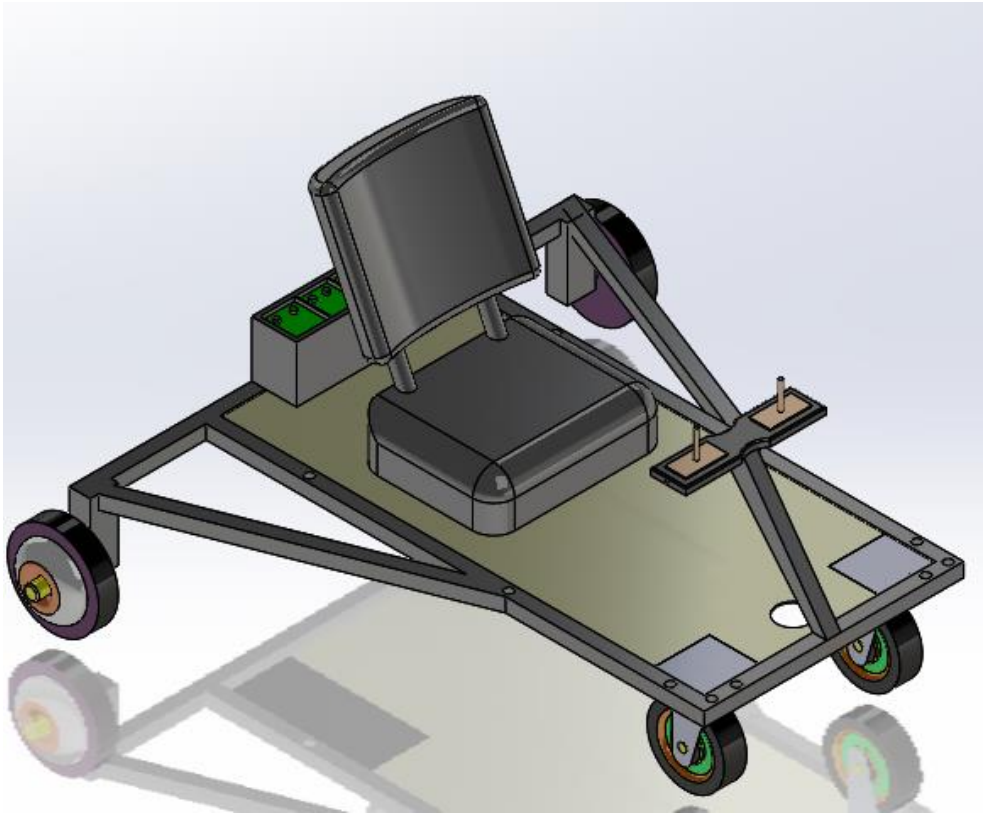

Figure 7 CAD Design Isolated View

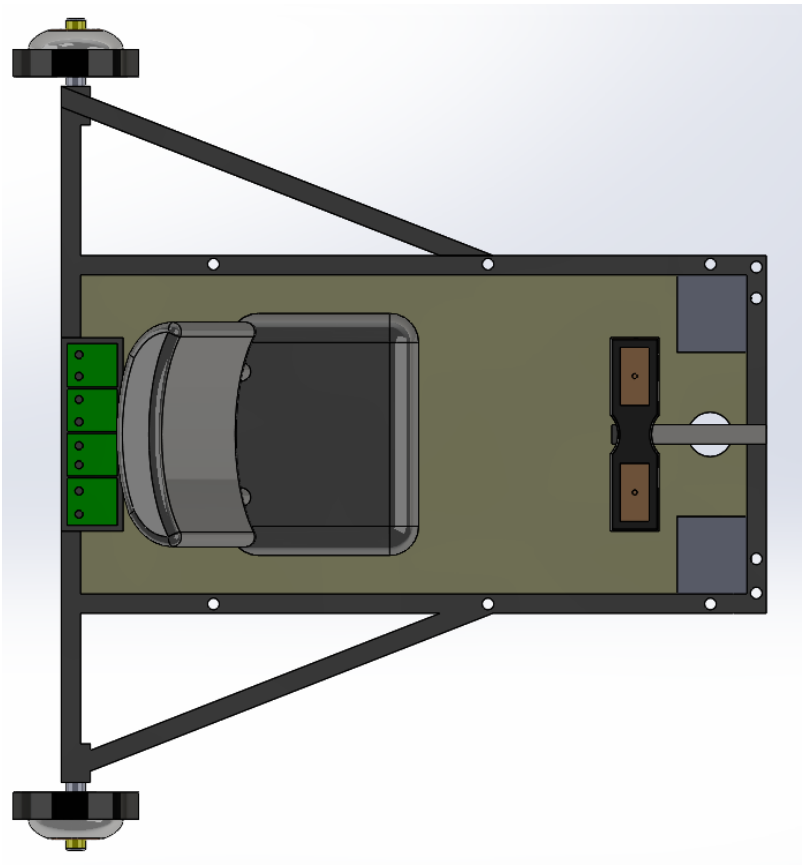

Figure 8 CAD Design Top View

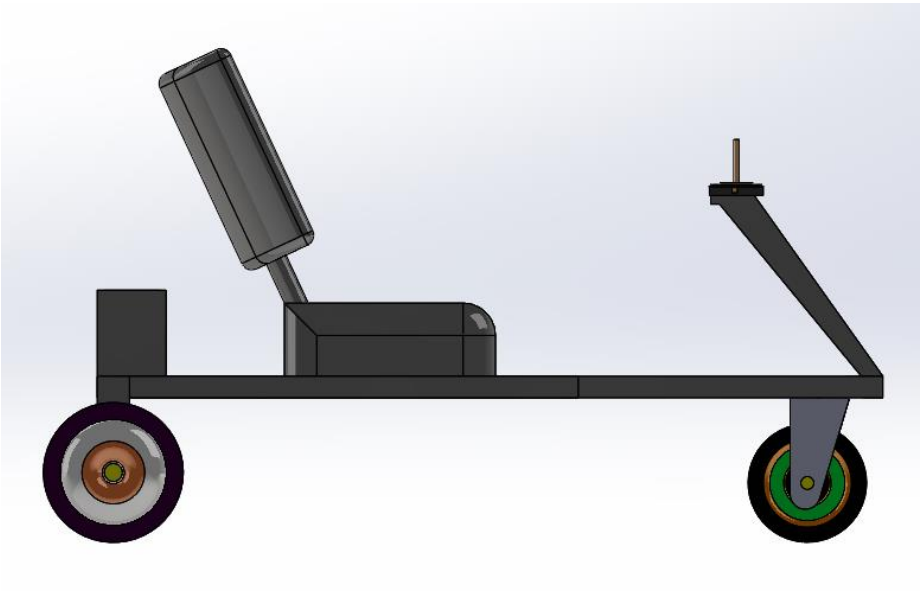

Figure 9 CAD Design Left View

7. Appendix

Table 1 Bill of Material

Parts	Image	Market	Price
Toolkit 550 Piece Metric Sheet Metal Screw Assortment - Contains 13 Popular Sizes [1] Option-B		Amazon	$5.99
BAA SHOP Two Wheels Mini Smart Self Balancing Scoooter (Adapter) [2]		Amazon	$10.99
Lap Seat Belt, Chrome Lift Latch, 60 Inch Length [3]		Amazon	$14.64
MDF Panel (Common: 3/4 in. x 4 ft. x 8 ft.; Actual: 0.750 in. x 48 in. x 96 in.) [5]		The Home Depot	$35.66
Wise Economy Low Back Seat [6]		Amazon	$33.89

SOLOOP 480Pcs 12 Size Assorted Insulated Electrical Wiring Wire Terminal Crimp Connector Kit Butt Spade Set [7]		Amazon	$20.98
Caster Set (2 Swivel/2 Locking) [8]		Global Industrial	$33.89
Wire Rope Clip, U-Bolt, 1/2In, Forged Steel*4 [9]		ZORO	$49.63
48 in. x 1-1/4 in. x 1/16 in. Plain Steel Square Tube [10]		Home depot	$17.66
4 x (1-1/2 in. x 36 in. Plain Steel Angle with 1/8 in. Thick [4]		The Home Depot	$37.88

Gold new Self balancing 2 wheel mini hover board electric scoooter hoverboard used [11]		Amazon	$180
2 JLF 6mm Hollow 316L Shaft – Standard [12]		paradisearcadeshop.com	$30
Minions All Natural~Cotton Fabric by Quilting Treasures~1649-24305-Zfor Quilting [13]		Walmart.com	10.95
Product Title 2 Pack Oodles Monster 55 Inch x 3.5 Inch Jumbo Swimming Pool Noodle Foam Multi-Purpose [14]		Walmart.com	$1.88
High-Temp Split Loom - 3/8"		Delcity.com	$ 0.25570
Morning Glory Foam Sheet, 24"L x 96"W x 1"H		Walmart.com	$6.84

MAXI Foam Padding - Blue		Walmart.com	$2.49