UGRADS Presentation

Portable Carrier B

Team 18F27

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Overview

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Introduction

- One major problem after grocery shopping, is transporting the bags from the car trunk to the house.
- The number and heaviness of the bags can make people do many trips from the car to the house.
- Living on high floors with no elevator, will take much effort and more time in order to transport the bags.
- Without any doubt, the portable carrier is an option to overcome this issue.

Figure 1: A man carrying grocery bags [1]

Client and Sponsorship

Client:

- Dr. Moghaddam

Technical Advisor:

- Dr. Trevas

Stakeholders:

- People with disabilities
- Shopping lovers

Sponsor:

- Mechanical Engineering Department

Project Goals

- Design, manufacture, and test a portable carrier design that can easily:
  - Carrying people's bags up to 50 lbs.
  - Climb stairs.
  - Fits into a car trunk.
  - Travel from 100 to 500 feet.

Research for Existing Designs

Figure 2: Garaventa Stair Carrier

Figure 3: Tripod Wheel

Figure 4: Hydraulic lift system

Engineering Requirements & Technical Value

Table 1: Engineering Requirements

Engineering Requirements	Technical Value
Traveling Capacity	100 feet to 500 feet
Climb stairs	9 in
Size	3 x 3 ft^2
Weight	20 pounds
To carry weight	50 pounds
Persons age to use	7 – 70 years
Height	1 ft.

Designs Considered

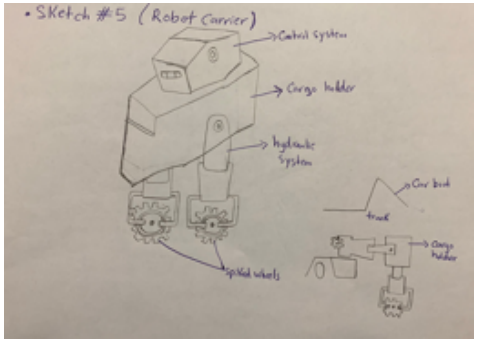

Figure 5: Robot carrier

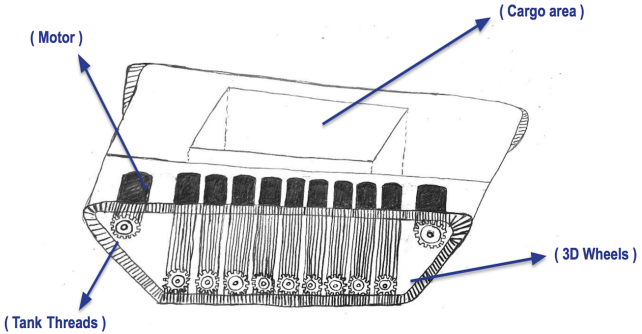

Figure 7: Robot roller

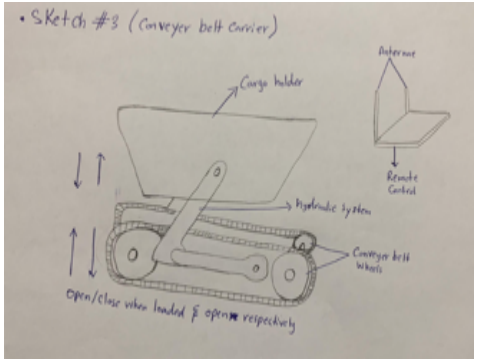

Figure 6: Conveyer belt carrier

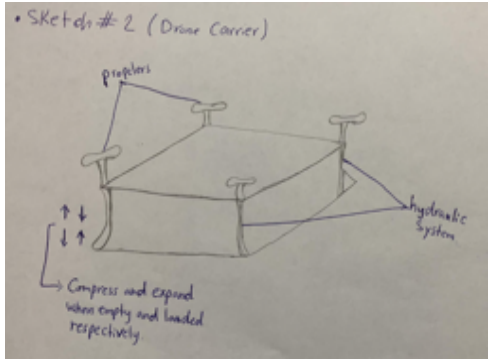

Figure 8: Drone carrier

First Design

- We made a design inspired from the war tank design.
- The design was bigger than what we anticipated.
- The design has failed due to how its look, and its size.

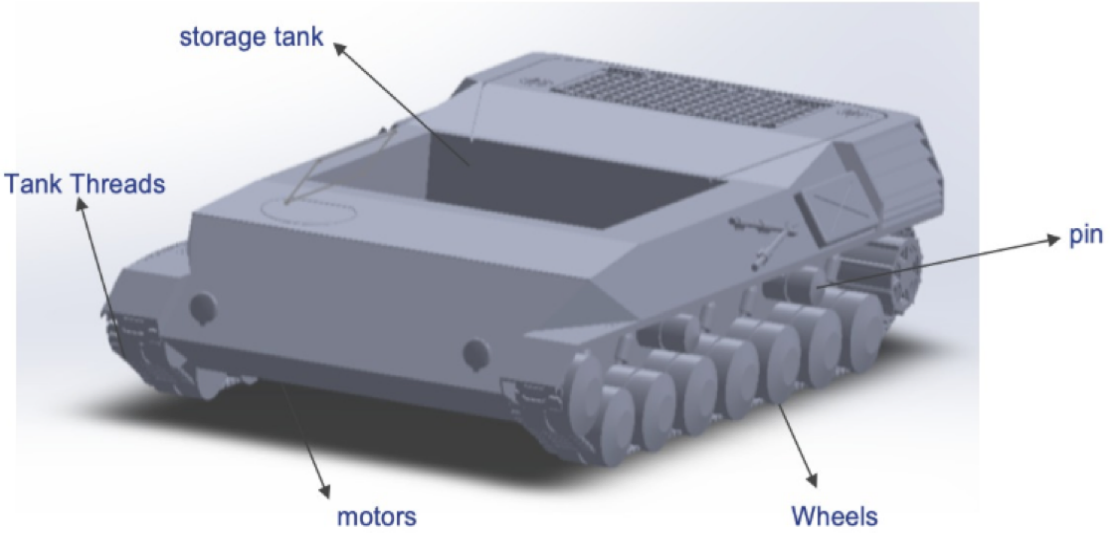

Figure 9: Our CAD Model of the First Design

Final Design

Based on our decision matrix, the Robotic roller design become our final design.

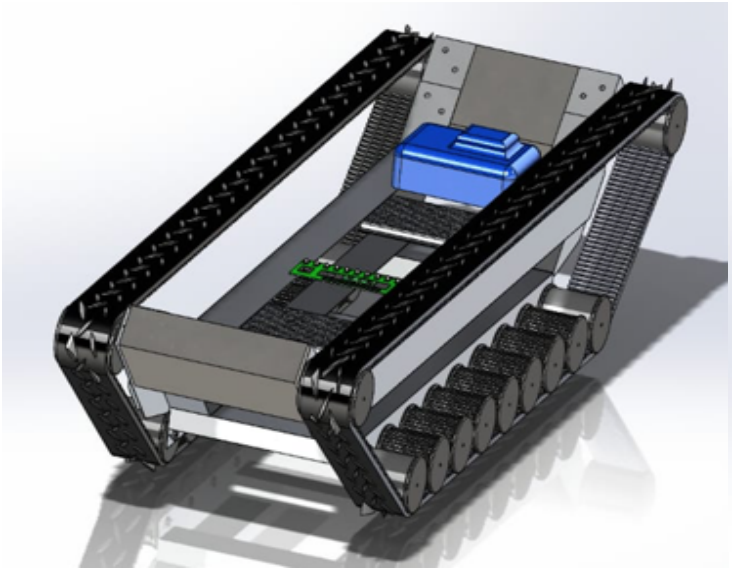

Figure 10 : CAD Model of the Final Design showing the inner components

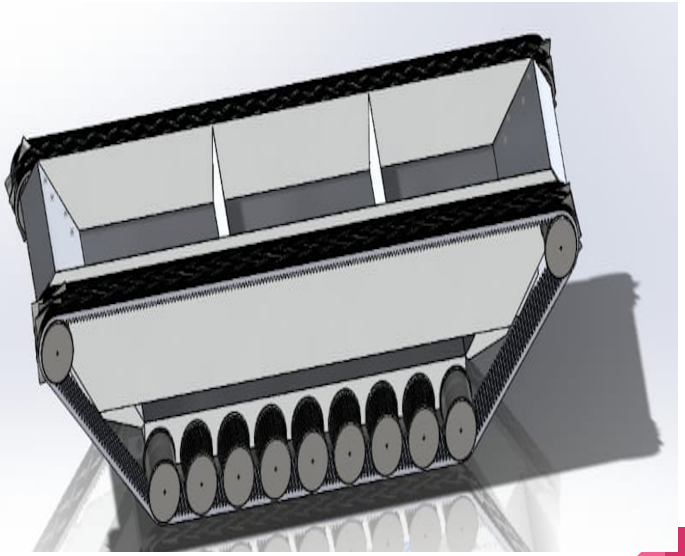

Figure 11 : CAD Model of the Final Design

Final Design

Figure 12: The Actual Final Design Without the Lid

Figure 13: The Actual Final Design with the Lid

Design Components

Figure 14: RC controller

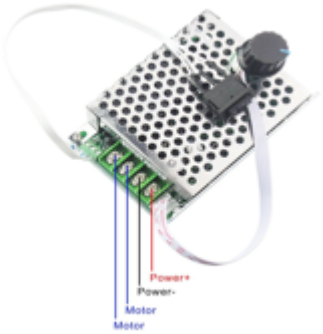

Figure 15: Speed Controller

Figure 16: Motor

Figure 17: Tank Threads

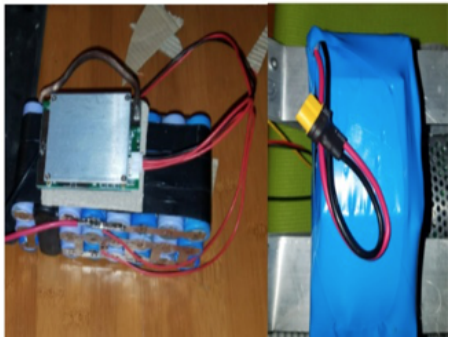

Figure 18: Battery Assembled

Figure 19: 3D wheels

Figure 20: 4 Channels Relay

Manufacturing

- Create two sides made from Angle Aluminum sheets. The bottom length is 26in. The sides pieces are 10in. The angle on either sides is 125 degrees. The total length of the device 36in.
- Create holes to install the motors.
- Create inner room to keep the electrical components safe.
- Cut the tank thread and adjust an outer portion to it to avoid sliding

Figure 21: Two sides of the product

Figure 22: 3.5in inner room

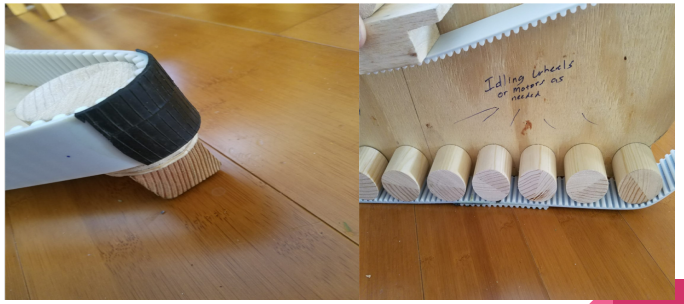

Figure 23: Tank Thread

Manufacturing (Cont'd)

- Install the motors.
- Install the BMS Battery.
- Wiring all the electrical components together.
- Cut a thin aluminum sheet for the cargo area, and cut other small sheets to make the container for the bags
- Install 22 3D-printer wheels.
- Install the tank threads.

Figure 24: Install the motors

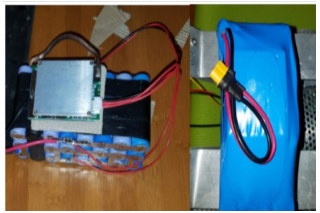

Figure 25: Battery Assembled

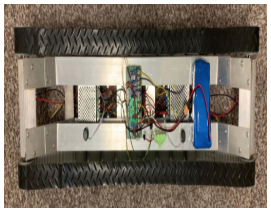

Figure 26: Wiring electrical components

Figure 27: Aluminum sheet metal

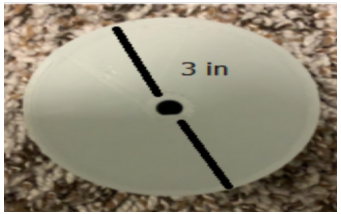

Figure 28: 3D printed wheel

Testing & Results

Table 2: Testing the requirements

ER's	Target	Actual
Travelling Capacity	100 to 500 feet	500 feet
Climb Stairs	9 in step size	5 in
Size	=< 3x3 ft^2	3x1 ft^2
Weight	=< 20 pounds	30 pounds
To Carry Weight	= 50 pounds	50 pounds (5 grocery bags)
Persons Age to Use	7-70 years	7-70 years
Height	=< 1 ft	1 ft

Video

Obstacles

- Make the device climb stairs easily.
- Avoid the damage issues when the device climb the stairs.
- Meet the budget limit planned.
- Make sure all the electronics parts are connected to each other, so the device can move.
- Choose a proper size of the device, so it can fits in a half size of the average car trunk and carry 50 pounds.

References

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Questions?