SNOW ROOMBA

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Abstract

The snowblower/yard tools market is widely filled with several popular competitors like Dewalt, Ryobi, Snow Joe, and EGO Power+, just to name a few. To combat the increase in injuries during the harsh Winter season our product will use GPS navigation to help decrease but hopefully eliminate the number of hospital visits caused by shoveling or pushing heavy snow.

Introduction

Each winter season with big snow-storms and everyday snowfalls, the risk of death from shoveling and heart attacks from pushing a heavy snow blower increase each year. Knowing those statistics, we invented a way to combine the GPS navigation mechanism of a Roomba indoor vacuum with the efficient make up of a snowblower to help reduce the number of deaths and heart-attacks caused by winter clean-up.

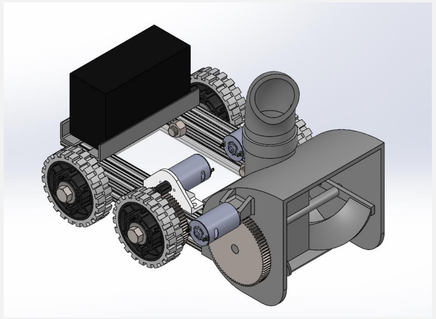

Figure 1: Full assembly

Methods/Materials

The design process was quick to fruition . The main shape was agreed that it would be a base with an attachment in the front to move snow out of the way. The next steps was to choose what type of snow removal process was going to be implemented. The two options that we had were the snowplow and the snow blower. The blower was chosen because the snow removal process is quicker

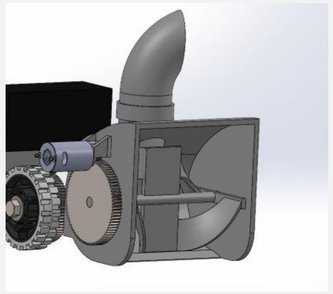

Figure 2: Blower and auger design

Electronics

The robot is controlled by a flight controller running Ardupilot Rover. Controlling the motors there are three DC motor speed controllers, two for driving and one for the blower. The GPS and compass also connected to the flight controller to give orientation and position data for autonomous driving. A RC receiver is also connected to the flight controller to manually control the robot and change modes of the robot.

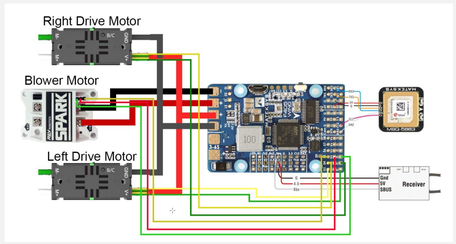

Figure 3: Electronic wiring diagram

Results

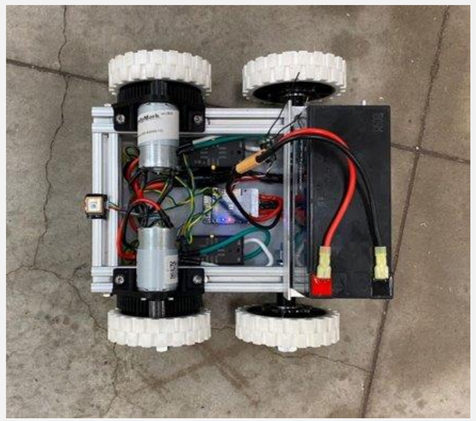

Figure 4: Electronic Layout on the Base

The base of the robot was built from 1020 aluminum extrude with a polycarbonate sheet to support the electronics. The wheels had 3D printed gears attached to drive them from the motors.

The blower assembly was designed to be printed in several parts to be assembled and epoxied together to reduce print cost. The motor was then attached to be the printed parts to spin the auger

The robot was able to drive well, and tell its position based on the compass and GPS position.

Conclusions

The Snow Roomba project exemplifies the ability to think outside the box in order to pursue a safe, consumer friendly solution for protecting people from Winter season injuries caused by snow. To accomplish this project, it required us to follow the design process and a multitude of knowledge gained through the application of Mechanical Engineering, Electrical Engineering, Robotics, hands-on labs, and Humanities courses taught through the curriculum at Wentworth Institute of Technology.

Acknowledgements

We would like to thank our advisor Prof. Voccio for all the help and advice he gave us these past two semesters. We would also like to thank Kenneth Thompkins for providing us a comfortable space to design and ask questions. We would like to thanks Herb Conners for taking time to purchase and provide us with a budget to purchase materials for our project.

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