EXECUTIVE SUMMARY

The beach is meant to be fun and relaxing, but no one likes to carry heavy items, such as: coolers, chairs, and umbrellas. The Beach Mule solves this struggle by carrying the load with its innovative and advanced array of features to set it apart from its competitors. Firstly, its autopilot capabilities allow the Beach Mule to follow the user wherever they go. While also being lightweight and compact, it offers an extraordinary level of convenience and carrying capacity. Figure 1 shows the design overview of the Beach Mule.

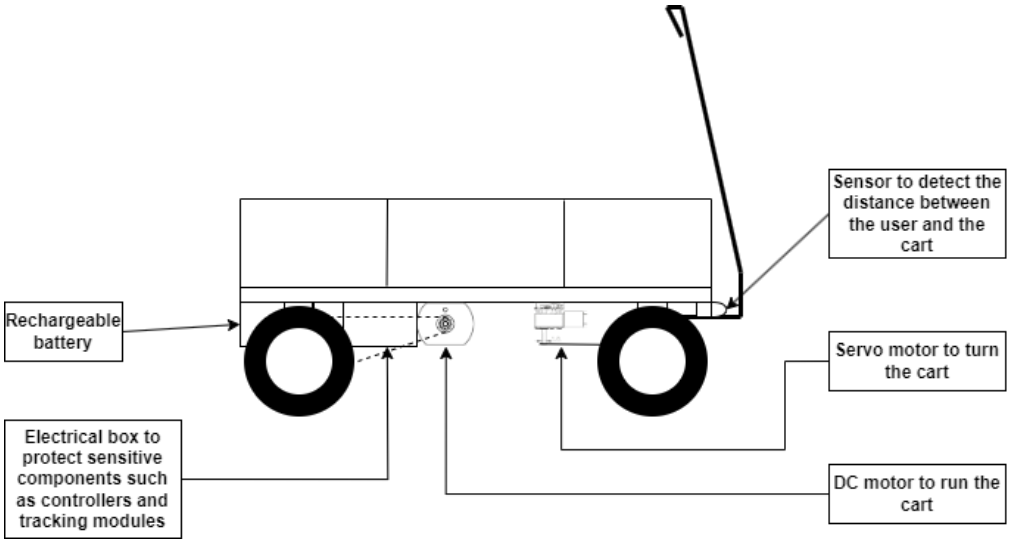

Figure 1. Beach Mule Design Overview

First, the design team considered multiple technical design constraints, including making the cart autonomous with the proper weight carrying capacity (120 lbs.), size (able to fit SUV/truck), and functionality. The Beach Mule features a long-lasting battery life (1 hour of constant running power) and stops a proper distance from the user (3-5 ft.). Secondly, practical design constraints dictated that the product is cost-efficient compared to competitors. The team chose the dimensions (38”x21”x12”) to be able to fit in a truck bed or an SUV trunk. The Beach Mule is also safe for the user to operate at any time. Lastly, the design follows engineering standard IP-55 (keeping components safe from foreign debris), uses GPS (getting proper GPS locations), and adheres to UL standards (using proper wire size for all components).

The Beach Mule is built rigid and sturdy for all beach terrains and is expected to last for years of enjoyment. The cart runs off two 12-volt batteries in series (24 V) that are wired to a fuse box to disperse power to all components needed. The motor used is a 500W brushed DC motor with ample power to propel the Beach Mule through all beach terrains. The microcontroller used is an Arduino Uno that can handle and control all the modules attached to the Beach Mule. The Bluetooth (iOS devices only), GPS module, and ultrasonic sensor all work together for the cart to be autonomous.

The Beach Mule can be improved in the future by adding an interface on a smartphone to use the different controls that are on the cart via buttons and switches. The Beach Mule also has uses beyond the beach. It can be used any time for a helping hand.