PA Central Support Group 3 – Self Propelled Walker

Overview

Many patients with neuromuscular conditions do not possess sufficient upper body strength to operate currently available walkers. The simultaneous action of grasping the walker and pushing it forward can prove to be burdensome. These patients would greatly benefit from a walker which is self-propelled to reduce the amount of energy required from the user.

Objective

The objective is to design and build a self-propelling walker which can be used in a rehabilitation hospital setting, focusing on patients with a need for assistive ambulation.

Approach

- Met with sponsor team to develop a list of customer needs and design requirements
- The team conducted several brainstorming sessions to formulate possible design ideas
- A concept selection matrix was created in order to rate the feasibility of each design concept
- A concept scoring matrix was then created to weigh options and modifications for the highest rated design concept determined by the concept selection matrix
- Research was conducted to ensure there were no patents relating to the highest weighted design
- 3D CAD models and drawings were created to convey the design ideas in further detail
- An alpha prototype was constructed and shown to the project sponsors
- Once testing was performed on the alpha prototype and suggestions for modifications were determined from the sponsor, a final beta prototype was constructed
- Overall testing was conducted on final prototype to ensure it meets all customer needs

Outcomes

- Test results of the beta prototype demonstrate that the walker can perform on various terrains, reach and exceed the maximum speed of 3mph, and is highly portable with a weight of less than 20 lbs. and a collapsible thickness of less than 1 foot.
- Though the final prototype meets most of the customer needs, there are several suggested modifications to the final manufacturing process plan to ensure that all customer needs are met
  - Larger Omni-Directional Wheels with a diameter of 5” and a load capacity of 150 lbs. to be installed on the rear legs of the walker
  - A braking system for the front wheel
  - Speed controller to ensure 3 fixed speeds of 0.5, 1.0 and 3.0 mph.
- The group was able to stay within the given budget constraint of $1000.00, spending $887.64
- Considering man hours for assembly/welding time, costs for suggested modifications, and profitability, a market price of $750.00 is suggested for the final design