



ACCMT ENGINEERING LTD.

**Helping Hand Walker
Project Proposal**

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February 7th, 2020

Dr. Emeka Oguejiofor, Paul Doiron P. Eng Department of Engineering

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Dear Dr. Oguejiofor, and Paul Doiron,

ACCMT Engineering is writing to you with the following enclosed proposal requested for February 4th, 2020. The proposal on the Helping Hand Walker Design has been a collective effort towards improving the mobility while reducing the number of injuries while using elderly walkers. This is the first of three reports regarding our state-of-the-art Walker. Please contact ACCMT Engineering know if you have any questions or concerns.

Regards,

Amelia LeBlanc, 201801218

Cameron de Winter, 201701799

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Table of Contents:

Group 7 Summary	4
Introduction.....	4
Problem Identification	4
Similar Products	5
Design Ideas	7
Engineering Analysis.....	9
Financial Analysis.....	9
Gantt Chart	9
Next Step	10
Conclusion	10
Figure 1.1	6
Figure 1.2	6
Figure 1.3	6
Figure 2.1	8
Figure 3.1	9

Summary

Walkers are used to increase the mobility of the user and help them walk independently while reducing the chance of a fall. But what is the point of it if the users can't get up by themselves? There are a lot people with the ability to walk around and enjoy their day but are sentenced to their couch because they must wait for someone to help them get up each time.

To solve this problem, we are proposing a new walker with a built-in lifting system. The system would help the user to their feet to they can walk around independently and not wait for a family member or healthcare provider to help them up. The Helping Hand walker is an affordable mixture between everyday walkers and heavy-duty lifting aids.

Introduction

For the design project, group 7 had some challenges coming up with a problem to focus on. Initially deciding to look at the problem of water usage in irrigation systems and how fresh water can be better utilized. There are many places worldwide that have water shortages/droughts that need ways to minimize their water waste. So, with this being a large issue with fresh water sources decreasing, the problem was coming up with a way to cut down on water waste for crops to also help crop growth and consistency. After 3 weeks of brainstorming and further research, it was decided that this problem didn't suit the group very well. With no one having a farming background, it would have been more of a research paper than a design project.

After a group discussion, there was a switch in project ideas to improve on the current walker for the elderly and disabled. Walkers are great for seniors who are struggling with reduced mobility to still have an active lifestyle but there are still many risks associated with using a walker. According to a National Center for Injury Prevention, up to 47,300 people each year over the age of 65 go to the ER due to a fall with a walking aid. There is a need for a product to help solve this issue.

Problem Identification

For senior citizens or people with low mobility issues, walkers are a safe, flexible, cost effective way to still maintain an active lifestyle. They offer a support system that allows the user to lean on the walker for balance and to help guide them as they walk. According to an article Tech Times by Summit Passary, 11.6 percent of elderly people in America use walkers to reduce their chance of falling. This shows a large group of people use a walker which creates the need for improvement where seen applicable.

However, the problem with standard walkers is that they only assist the person whilst standing up. Going from the sitting position to the standing position, for some, can be challenging or even impossible without the help from another individual. The Helping Hand Walker provides a

support that gradually raises the person from the sitting position without putting a strain on the lower back and minimizes the chances of falling over due to instability.

Similar Products

There is a wide range of walking and lifting aids on the market. These products range from a simple stability tool, all the way to heavy duty lift and transportation aids. When looking into creating a new product it is important to look at other products currently on the market. Looking at other products on the market gives helpful insight when trying to figure out what needs people may have. With so many products on the market, it is easier to see where the needs of people can be met by seeing what is not available. There are two main categories that summarize walking/lifting aids. The first being basic walking aids such as walkers and rollators, and the second being heavy duty lifting/transportation aids. There are some products on the market that are somewhere in between these two products, but the majority lie in either category. While these two categories cover many of the problems people with mobility issues face, there is still a large gap in the market. Heavy duty lifting aids are great at helping people with less strength get to their feet, but once the person is up, they have little to no mobility of their own. On the other hand, basic walking aids offer great support for people with stability issues while walking, but most of the time offer no support when standing up from a sitting position.

When a person injures or loses strength in their mid to lower body, they have a lot of trouble being mobile. These problems can be as small as stability issues all the way to impairment of walking altogether. These issues can be solved with the use of basic walking aids. There are three basic walker types on the market right now: the standard walker, the front wheeled walker, and the 4 wheeled rollators. The standard walker is the most basic of the three having handles on either side of the user and a non-slip rubber tip on each of the four legs. This type of walker is used by people with little lower body support and a decent amount of upper body support. The four rubber tipped legs give great support when moving about but provide less maneuverability than other models. The front wheeled walker has a similar concept but with more mobility. The front wheels allow the user to push the walker forward with more ease than the regular walker. With more ease comes more responsibility as the walker loses the sturdy support that the standard walker offers. The third basic walker model is a four wheeled bariatric walker. This model offers the most mobility and maneuverability to the user, where the front wheels pivot the back wheels glide giving the most directional control to the user. This model is more for people with a moderate amount of strength all together, but need a bit of stabilizing support every so often

In more extreme cases, patients may not be able to stand or even walk on their own. There are a few products on the market such as the Get-U-up sit-to-stand lift aid. These products allow for patients that have difficulty getting up, the ability to do so with ease. These products also offer complete walking support, but this is unnecessary information as the goal of this project is to

design a personal walker that needs no additional help. That's why these are great for people that need help when standing up from a sitting position but lack the basic stability aspect that most people would prefer when finally standing. Some products are in the middle ground between basic support walkers and heavy-duty lifting/walking aids. Even though there are a few models that give support when standing up, no design has any good answer to complete sit-to-stand support.



Figure 1.1



Figure 1.2



Figure 1.3

Design Ideas

The solution consists of redesigning the current lifting aid walker system to make a new product that falls between the simple lifting aids and the heavy-duty lifting apparatus that will be an affordable solution to the problem. The walker will have a built-in mechanical lift system that will give the user the ability to get up by themselves. The user would put on a harness from an upright sitting position. The harness will require minimal movement to put on. The harness will be attached to our motor system by straps that will reel in when the motor is activated. The lift will move at a slow pace, so it won't apply too much force to the user causing unwanted strain. The motor will be easy to operate, and all buttons/switches will be accessible to the user from a sitting position. There will be wiring inside of the walker's members that will connect the buttons to the motor. There will be different weight settings for the lift, so that the force applied to the user isn't too weak or too strong, which can lead to injuries. The motor will pull the person up with the help of their own upper/lower body strength. Once the person is standing, the harness and straps will act as extra balance support to reduce the risk of a fall. The walker will be lightweight so it can be picked up and moved around by the user with ease. The motor system will just be suited for the special walker that will be designed. With the many different walkers available to the public, the lifting system wouldn't be suited for all of them. A system that could

be attached to every walker system would be ideal, but there are many more challenges with this product.

In the predesign phase, there are a few major questions that will need to be answered.

1. The walker needs to stay stationary as the lift is in progress and be able to support the user as they are being lifted. There needs to be supports or a counterweight that will cause the walker to not tip over as it is lifting the user from their chair. A few ideas to reduce this is to widen the back supports of the walker making it more stable, as you would see in a heavy-duty style walker. Lots of research will be completed in this area so the best solution can be established.
2. The motor that best suits the product will need to be found. We need the motor to be strong enough to lift the weight of the user with virtually zero chance of failure. The system also needs to be economically viable, to maintain the low cost of the walker. The group will consult experts in this area to figure out what system best suits the product.

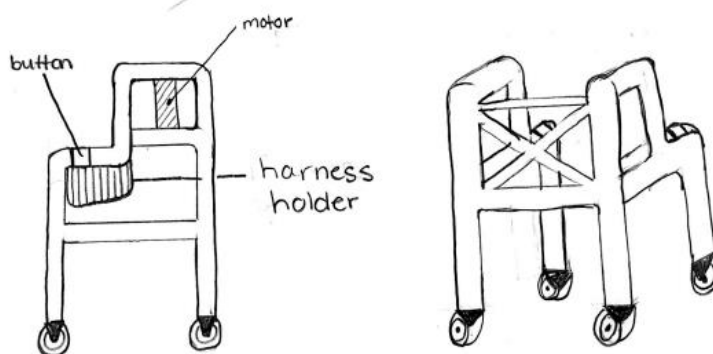


Figure 2.1 Hand-drawn Design “Helping Hand Walker”

Engineering Analysis

To successfully complete this project there will need to be many different mechanical, electrical and structural analyses done. There will be dynamic's calculations to complete when dealing with the load that the motor will need to apply to lift the user from their chair. The device will work for people of many different sizes, so calculations will be completed to determine the maximum and minimum weight that the machine can withstand. The system will have different settings for different weights. We will need to write a program to indicate to the motor what setting it should be on. This will require circuit analysis as well as computer programing. Also, we will need to complete statics and strength of materials calculations to make sure the system is stationary and that our design can withstand the forces being applied to it.

Financial Analysis

As of right now, there is no current price analysis for this product. The group intends to build a physical prototype. It will be constructed using an already assembled walker, extra aluminum tubing to add on supports, electric motors, and a harness system. With the lack of information on what exact materials will be used an exact cost cannot be estimated.

On average walkers cost anywhere between \$35-\$300. The product should be within this price range to stay competitive with other brands, but because of the added lift system we will expect to be out of this price range. Research will be conducted as the design process continues for how much parts cost, but nothing is set in stone.

Gantt Chart

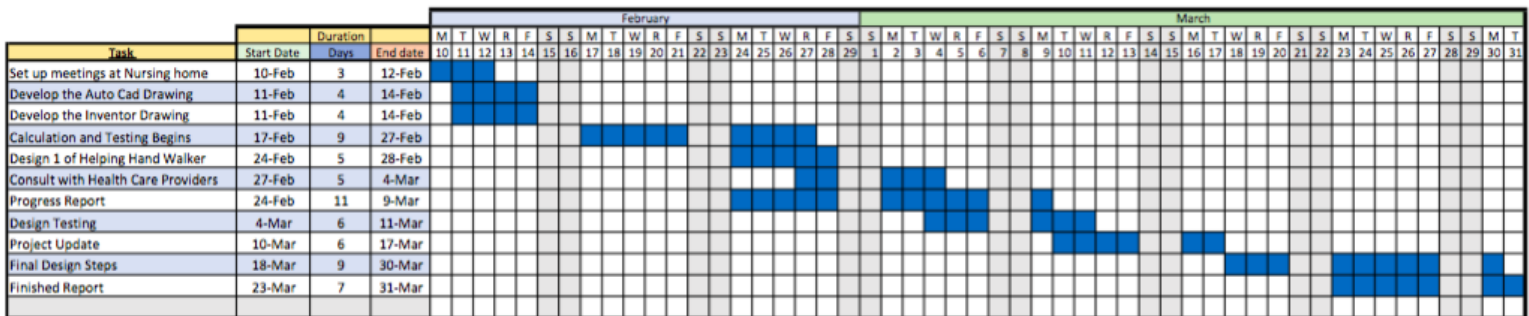


Figure 3.1: Gantt Chart Overview:
February 10th, 2020 – March 31st, 2020

Next Steps

The next steps taken will consist of visiting assisted living facilities to learn more about the problem elderly people face. This will be accomplished by interviewing the CCA's and nurses that work with the elderly every day. As well as getting information from the residents to make sure the product is suited to their exact needs. Also, a meeting will be set up with Rochelle Heighton, who is the head occupational therapist at St Martha's Hospital. This first-hand information will give an insight on the day to day problems seniors face. Once the research aspect has been completed, Auto-cad and Inventor sketches will be completed so there is a benchmark of the design. Next, a first-round of calculations will be completed to determine what power needs to be generated from the motor. All of this will be completed by the progress report presentation on March 6th.

Conclusion

Going from the sitting position to the standing position, for some, can be challenging or even impossible without the help from another individual. The Helping Hand Walker will give the people that are affected by this a boost to help get them upright. This added assist will give back the freedom of movement to the individuals who we're once constrained whilst sitting down, while also minimizing the risk of falling.