

GNG2101 Report

Project Deliverable B - Needs, Problem Statement, Metrics, Benchmarking and Target Specifications

Submitted by

[One handed walker steering. A2, Team 3]

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Abstract

The main objective for this deliverable will be to define the problem statement and the client's needs. After defining the problem, we will proceed to identify the metrics involved, leading us to do market research and benchmarking on existing products. Then we will proceed to outline our target specifications with somewhat accurate numbers for attributes such as dimensions and weight of the device. Finally, we will be reflecting on how the client meeting helped us answer some of our questions and have a clear idea about what her needs are.

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1 Introduction

As we talked to our client, we have learned that she has severe mobility issues which are caused by a hypermobile Ehlers-Dalos syndrome (hEDS), so using a walker is a challenge for her knowing that her shoulders can dislocate constantly. Her condition is rare and is getting worse day by day which can make daily tasks difficult such as going to the park, getting groceries and even moving around her house. The task is to create a device to attach to the client's walker in order to make it steerable with one hand. This would enable the client to do her daily tasks independently while one of her shoulders is dislocated. This potential solution could help many people around the world with similar conditions to improve their quality of life.

2 Problem analysis

- **Client Statements**

1. I want the device to be long-lasting, be permanent
2. I want to be able to walk over snow banks
3. I want the device to be detachable and versatile
4. I want the device to be stable, balance is key
5. I want the device to be able to fold on itself with the device on
6. I want the installation of the device to be easy
7. I want a light on the walker to turn on at night
8. I love the big wheels on my walker
9. I would like for the walker to not get snow stuck in the wheels

10. I want to be able to steer the walker

11. I want an LED light (no strobe lights) to attach on the device

- **Translated customer needs**

#	Need	Imp
1	The device lasts a long time	4
2	The device can endure extreme weather conditions (snow, rain, cold and heat)	3
3	The brackets can be on installed easily on any walker	5
4	The fasteners fit tight	4
5	The device allows an easy installation without making permanent changes to the walker	3
6	The device is affordable	2
7	The device enables the walker to function on different terrains	3
8	The device is lightweight	3
9	The device is capable of turning with one hand	5
10	The device is safe to use at night	2

- **Problem Statement**

“A need exists for walker users with one operational arm to safely and easily steer the walker with a straightforward, attachable device that is versatile, durable, and cost effective.”

3 Design

- **Metrics**

Metric #	Needs #	Metric	Unit
1	9	Force required to use device	N
2	9	Manoeuvrability (Turning Radius)	m
3	9	Agility (Rotational speed)	deg/s
4	8	Total weight	kg
5	7	Dimension	m ³
6	2,7,1	Reliability (MTBF)	h
7	1,8	Material	N/A
8	3,5	Detachability (Time to assemble)	min
9	4,9,10	Ease of use	N/A
10	6	Cost	CAD

- **Target Specifications**

Metric #	Functional Requirements	Relation	Value	Unit	Verification Method
1	Force required to use device	<	10	N	Test
2	Manoeuvrability (Turning Radius)	<	2	m	Test
3	Agility (Rotational speed)	>	30	deg.s ⁻¹	Test
#	Non-Functional Requirements	Relation	Value		
4	Total weight	<	8.5	kg	Test
5	Dimension	<	0.55	m ³	Test
6	Reliability (MTBF)	>	2500	h	Estimate
7	Material	-	Aluminium	N/A	Analysis
8	Detachability (Time to assemble)	<	20	min	Test
9	Ease of use	-	-	N/A	Test
#	Constraints	Relation	Value	Unit	
10	Cost	<	100	CAD	Given
11	Time to complete project	<	1/12/2022	Date	Given

- **Benchmarking**

The technical benchmarks are based on three products that accomplish the same task as the product we're designing. (The Nitro walker is the one used by the client)

These products are evaluated on a colour scale of 1 to 3 (higher is better) :

3 = Green

2 = Yellow

1 = Red

Specification	Importance (Weight)	Nitro Euro Style Walker Rollator.	Electric Wheelchair	Manual Wheelchair
Make		Drive Medical	Fold and Travel	Medline
Cost (CAD)	5	400	2900	287
Load Limit (N)	3	1300	1470	1332.8
Material	2	Aluminium	Aluminium	Aluminium
Dimension (cm)	3	70.5 x 58.4 x 92.2 centimetres	72.2 x 62.5 x 95.5 centimetres	80 x 64.8 x 92.7 centimetres
Ease of Installation	4	3	2	2
Force required (N)	5	10	1	130
Manoeuvrability	4	3	2	1
Agility	3	1	3	2
Reliability	4	3	1	2
Total		83	60	67

4 Reflection on the client meeting

During our client meeting, first our client made a brief presentation about the origin of the project and talked about her needs. At the beginning of the presentation we were able to get a better understanding of her condition and also clarify the features of the potential device. She has also talked about her safety concerns about the equipment and how it needs to be stable and versatile because she will be changing her walkers as they wear out. It is also important to mention that the device should be easy to transport along with the walker. It should also be easily installable by her team of physicians and be used interchangeably between her two arms; if one dislocates she could transfer the handle accordingly. Some additional features demanded by the client are an LED light to see bumps in the dark and a possible emergency button in case she needs health assistance while outside.

5 References

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