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

Submitted by

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Abstract

This report reveals specifications and metrics of a pandemic-friendly guiding cane, as well as the findings of the interview with the client that requested the product, and the targeted needs and values they have concerning the product features and the importance of said features.

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1 Introduction

With the Covid-19 pandemic still a prevalent issue, those who are visually impaired are finding it increasingly challenging to safely be guided by others, while still respecting the social distancing measures. For this reason, our team has decided to create a guiding cane that complies with the six foot distancing precaution, while still being able to guide the user through their everyday responsibilities and activities. This project is crucial since there are currently a very limited number of marketed solutions, some of which do not fit our customer's needs, and others which are too costly for the product that is being offered. According to the basic user requirements, this product must be graspable from both ends so that one person can lead, while the other is being guided. The product should be cost effective, light, collapsible and durable. The guiding cane will be created with the intent that our client Kim, and others, will be using it to safely navigate through any scenario amidst this pandemic.

Our team is best suited for this project because of how effectively we collaborate with one another. We stress meeting deadlines, producing quality work and consistent communication. Our group consists of hardworking individuals with backgrounds in mechanical engineering and software engineering. This implies that each of us brings different perspectives to the table which aids in creating plenty of innovative and creative solutions. Our product will be the best solution to the issue at hand because we intend to decrease product cost, increase comfortability, and include features which will help our client navigate their surroundings.

This report consists of 2 major sections. The first section covers the client statements and interpreted needs, the identified problem statement, the metrics to base our product against, competitive benchmarking examples, and the target specifications of the product we will be

designing. The second, and final, section concludes the report and proposes recommendations for future work.

2 Problem Definition Process

2.1 Client Statements and Interpreted Needs

Table 1: Client Statements and Interpreted Needs

Groupings	Customer Statement	Interpreted Need	Priority (1-5)
Functionality	It's difficult trying to get around a store or construction zone.	The cane can be used to guide someone through rough terrain.	2
	I'm not certain of how safe it is to touch other people because of Covid.	The cane spans 2m or 6ft to separate users as a safe social distancing measure. The size of the cane is adjustable. The cane can be used to separate both users (guide and client) by 6 ft. The cane can be contracted to a minimum of	5
	A guiding cane is important for activities such as walking and running.	The cane can be used across several terrains. The cane can be used during high-intensity and low-intensity activities.	4
	I would like it to function in crowded areas or narrow streets.	The cane is thin. The cane allows people to walk one in front of the other.	3
Form	It's uncomfortable when people handle the end of my white cane.	The handle should be comfortable to hold on both sides	3
	I'm picturing 2 handles with a pipe in between.	The cane resembles a pipe with 2 handles at the ends	1
	I'll be either carrying it around or storing it in my bag.	The size is adjustable. The cane is lightweight.	5

		The cane is collapsible.	
	I want to be able to use it at night.	The cane is made of reflective materials so it can be seen by cars at night	4
Useability	It's difficult to share directions with the person guiding you.	The cane can communicate directions to the other person	4
	I'm worried of getting lost or separated from my guide.	The cane has a strap or other means to ensure the user has control of the walking stick. GPS can be used to share location with guide.	4
	Some paths I travel are narrow so walking side by side is difficult at times.	The cane can comfortably be used down narrow passages.	2
	I would like to ask strangers to help direct me.	The cane has comfortable clean handle for the stranger to use	4
	It's difficult to navigate my surroundings	The can has navigation tools to help the user get to unknown places.	3
	It's difficult to feel the direction the person guiding is going due to the type of handle.	The user will be able to sense the direction that the person is guiding them in.	3
Cost	Existing products are too expensive.	The can is affordable	~~5~~
	Most canes are $40-60.	The cane is within the budget.	4

Table 2: Legend of Importance Ranking

Legend of Importance Rankings
1. Undesirable
2. Not Important
3. Desirable but not necessary
4. Highly Desirable
5. Critical

2.2 Problem Statement

A need exists for those who are visually impaired to be safely guided by others, while respecting social distancing regulations, using a portable device that is comfortable, collapsible**,** and cost effective for owners.

2.3 Metrics

Table 3: Metrics and associated units

Need Being Addressed	**Metrics Description**	**Unit**	**Functional Requirement**	**Non-Functional Requirement**	**Constraint**
The cane is lightweight.	Weight of the cane	Lbs.		x	x
The cane spans 2m or 6ft to separate users as a safe social distancing measure.	Length of the cane (Extended)	Cm	x		x
The size is adjustable.	Length of the cane (Collapsed)	Cm	x		x
The cane is collapsible.	Area when compact	Cm^2	x		x
The cane is comfortable to hold.	Handle Length	Cm		x	

The cane is comfortable to hold.	Handle Width	Cm		x	
The cane is made of reflective materials so it can be seen by cars at night.	Reflectiveness of the material	%	x		
Cane is affordable and within budget.	Production Cost	$ (CAD)			x
The cane is collapsible.	Segment Length (Collapsible Parts)	Cm	x		x

2.4 Benchmarking

Table 4: Comparison between existing products

Product Name	Final Specs	Comments
WeWALK Smart Cane 	**Cost:** $599 USD **Product Weight:** 280 gr (without power supply) **Product dimensions {W x L x H}:** 25 mm x 289 mm x 44 mm	** Retrieved from: https://wewalk.io/en/guide/ - Overhead obstacle detection -Touchpad to control smart phone -Voice assistant built-in

		-Relays shop and public transportation info through the app
TRAVELEYES Companion Cane 	**Folded dimensions {W x L x H}:** 360 x 95 x 62mm **Cost:** $108.54 USD **Product weight:** 0.33kg **Length:** 1500mm fully extended, 360mm folded **Material:** Aluminum **Minimum extension**: 700mm	** Retrieved from: https://www.traveleyes-international.com/blog/ccinstructionsforuse/ -Folding, extendable shaft -Non-slip handle -Durable elastic strap -Adjustable
DEAN AND TYLER **DT Guide – GuidE Dog Harness Handle** 	**Handle Length:** 20 inches **Cost:** $30.0 (USD) **Material:** Steel covered in leather (Handle) & Brass plated steel buckles	**Retrieved from: https://www.dtdogcollars.com/DT-Guide-Guide-Dog-Harness-Handle-p/dthguide_hndl.htm -Sturdy Steel Handle Covered in Leather, 20-inch default also available in 16-inch -Handle is Removable and Does Not Stand Vertical on its Own
MORGAN DYNAMIC RESEARCH **Telescopic Canes** 	**Extended Length:** 48-inches **Collapsed Length:** 9.5 inches **Material:** Carbon fiber shaft and Nylon Tip **Cost:** $95 (USD)	**Retrieved from: http://morgandynamicresearch.com/sales/specialty-navigation-canes-for-the-blind/ -Very structurally strong -Can last for years with gentle use

2.5 Target Specifications

Table 6: Target Specifications

Metrics Description	Range	Unit
Weight of the cane[1]	3 - 5	Lbs.
Length of the cane (Extended)[2]	180 - 200	Cm
Length of the cane (Collapsed)[3]	20 - 25	Cm
Area when compact[4]	60 - 100	Cm^2
Handle Length[5]	10 – 15	Cm
Handle Width[6]	3 - 4	Cm
Reflectiveness of the material[7]	80-95	%
Production Cost[8]	40 - 60	$ (CAD)
Segment Length (Collapsible Parts)[9]	20 - 25	Cm

Justifications:

1. This would let it be light enough to carry in a person's everyday bag or backpack
2. This length is to abide by Covid-19 recommended social distancing
3. This is the length when the total length of the cane is collapsed into 8 parts
4. This is the length of the collapsed object multiplied by the width of the cane
5. Slightly longer than a person's hand
6. This is roughly the diameter of a broom handle
7. This is the reflectiveness of aluminum
8. This was the given estimate for the project

9. This is the length when the total length of the cane is collapsed into 8 parts

3 Conclusions and Recommendations for Future Work

Since none of our group members are visually impaired, our group was unable to relate to the problem at hand. Our client meeting, therefore, helped us empathize with our client to gain a real understanding of how this product may be used, as well as what features it must include to be of daily use.

Throughout the meeting, we were able to record and list some of our client's statements, which we then translated into prioritized needs. This process emphasized the main features our cane would have to include, as well as what problems these features would be solving, allowing us to come up with a problem statement. We then compared various existing products to get a better sense of how we could make our product better than our competitors. This led to the creation of target specifications to include in our design, in order to optimize its functionality.

To conclude, this deliverable allowed our group to better understand the task at hand, which allowed us to determine some of the main functions our cane will possess. For future deliverables, we will continue to empathize with our client to expand our knowledge on the needs of the visually impaired. We will also continue to work collaboratively on deliverables, as this allows for various points of view to be shared and discussed, leading to a more successful final product.

4 Bibliography

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