Engineering Design - GNG 1103 [C]

Project Deliverable C

VR/AR for Recycling

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Section C03 – Group 11

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Abstract

This report is intended to produce a prioritized list of design criteria, state the target specifications, as well as perform technical benchmarking. This document will rate the importance of the client's needs on a scale of 1 to 5 (1 being less important and 5 being priority); define the functional criteria, non-functional criteria and constraints; and access benchmarking of four applications, two providing recycling information and two educational mobile games on recycling.

Introduction

The last deliverable narrowed down the project based on the desires of the client, Mitch Bouchard. However, incorporating the desires of the client is difficult since the desires were presented with broad, unspecified terminology. Based on the needs of the cilent, a phone application was chosen for the final product as it met many of the clients desires: accessibility, user friendly, and cost efficient.

The consensus based on the client's needs was a phone application that incorporated the information from trusted recycling sources, but also incorporated a game like features to incite consistent use. Through benchmarking, it was discovered that no other application that meet all of the client's needs is currently on the market. As such, other applications that fit into either: informative recycling app, or recycling game app were gathered and critiqued. critiqued.

In this deliverable, the needs of the client are carefully considered and translated into more specific and achievable design criteria. Similarly, to gain a better understanding of the needs, phone applications with similar purposes were found, inspected and ranked against some of the more important design criteria. Finally, the design criteria and the benchmarking are gathered together to create detailed target specifications.

Needs and Design Criteria

Table 1: Needs interpreted as Design Criteria

Rank (1<5)	Need	Design Criteria
5	User Friendly	Easy to navigate Interface Little set up (Uses phone location) Speed (time it takes to load menus)
5	Accessibility	File Size (MB) Compatibility (Cross platform) Bilingual Colour Blind Accessibility

5	Accuracy	Accuracy (%)
4	Cost Effective	Cost ($)
4	Creativity	Original Design
3	Aesthetics	Smooth presentation – smooth transitions Simplistic interface Visually appealing
3	Fun	Incorporates games (in menus – not at forefront) Competition (Social aspect)
2	Education	Links to other Information sites Information bank

Table 2: Constraints and Functional and Non-Functional Criteria

Functional Criteria	Non-Functional Criteria	Constraints
Easy to navigate interface Accuracy (%) Compatibility File Size Speed Easy set up	Bilingual Smooth presentation/transitions Simplistic Visually appealing Incorporates games Competition Original design Information Bank Links to other information sites Colour blind accessibility	Cost (<$100) Time (2 months) Experience (Coding) Accuracy (95%)

Benchmarking

App development is challenging, especially creating an app that meets the client's needs. To create the best possible solution to the problem at hand, other applications that involved recycling sorting information or educational recycling games were researched. Four recycling apps; TOwaste, Recycle Nation, Bin the Trash and Have You Herd were found and compared. However, all of them were difficult to compare since two are strictly for recycling sorting and the other two are recycling games.

After benchmarking all of them, it was concluded that TOwaste was the best app for recycle sorting and Bin the Trash was the best recycling game app. Overall TOwaste was also the better app and the final product would benefit most being compared to it, but Bin the Trash also provided a framework for game aspects in the app. Although, TOwaste and Bin the Trash were highlighted as the best examples, some of the better design criteria of the other apps will be incorporated into building the optimal solution to ensure the best result.

Table 3: Benchmarking

Design Criteria	Applications			
	TOwaste	Recycle Nation	Bin the Trash: Recycling Game	Have You Herd
Cost	Free	Free	Free (contains ads)	Free
File Size	24.8 MB	32.1 MB	21.33MB	285.5MB
Compatibility (On both platforms)	IOS and ANDROID	IOS	ANDROID	IOS
Easy to Navigate Interface	4	2	4	3
Easy Set up	4	4	3	1
Bilingual	NO	NO	NO	NO
Smooth presentation/ transition	4	3	2	4
Simplistic	4	3	3	2
Visually Appealing	3	1	2	4
Incorporates Games	NO	NO	YES	YES
Educational	YES	YES	YES	YES
Total	32	27	31	30

*Note, some sections were based on subjective opinions of multiple group members

Target Specifications

Ensuring that the product meets as many of the client's needs as possible is the prime focus of this design project. As a result, there are several specifications that should be met with a high degree of effectivity.

As emphasized by the client, one of the most important factors to include in the product is accessibility, so that it may reach as many people as possible. To ensure this need is fulfilled, the goal of the app is to reach both major mobile platforms (iOS and Android), integrate bilingualism for both official languages of Canada, and to keep the file size to a minimum, aiming for roughly 20 MB.

Should AR make this goal difficult to reach, the file size could be raised to roughly 200MB. Additionally, colour blind accessibility may help to reach a wider audience, especially if AR technology is involved as garbage and recycling bins are designated by different colours.

Another important aspect is user friendliness, since this will encourage people of all ages and conditions to use the app. The aim is to design a straightforward interface to ensure everyone can navigate the entire application with ease and reduce the amount of time to set up the program and switch between features to mediate frustrations.

The final must-have for this product is to have an accuracy of at least 95% in order to justify the need for this application. Other constraints include a cost to manufacture of less than $100, a time period of 2 months, and the coding expertise of the developers.

Final target sets include creating an original and visually appealing design, ensuring the application runs smoothly, preferably with very few required bug fixes, incorporating educational sections in the form of an information bank or links to trusted sources, and lastly, implementing fun and competitive aspects to encourage continuous use and recommendations.

Conclusion

In this deliverable, it has been concluded that the most important design criteria are the user friendliness, accessibility, and accuracy. The most important design specification which must be fulfilled is having a sorting accuracy of at least 95%. However, the functional and non-functional design criteria to be user-friendly and accessible is just as important and should be equally prioritized. It has been determined through the benchmarking process that the app TOwaste and Bin the Trash are the best apps to compare our product to as they are accessible and user friendly. These criteria and benchmarking apps will be used to ensure the product is the best possible solution.

References

[1] City of Toronto, *TOwaste – City of Toronto*, v1.2.1, 2020. [app]. Accessed: Feb 3, 2021. Available: App Store and Play Store.

[2] ERI, *Recycle Nation*, v2.0. [app]. Accessed: Feb 3, 2021. Available: App Store.

[3] Majiho Games, *Bin The Trash: Recycling Game*, v1.03.32, 2021. [app]. Accessed: Feb 3, 2021. Available: Play Store.

[4] ASDA, *Have You Herd*, v2.1. [app]. Accessed: Feb 3, 2021. Available: App Store.