RecyCLIC

Team B03

Deliverable C - Design Criteria

Engineering Design – GNG 1103

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Abstract

This project deliverable illustrates design criteria based on the needs brought forward by our client. These client needs have been previously discussed in deliverable B and will be further expanded upon in this deliverable. The design criteria have been divided into three groups: design constraints, functional criteria, and non-functional criteria. Additionally, our group has benchmarked similar products in order to help gain a better understanding of our goals for the project.

Among Recycle Coach, Trashly, and iRecycle, Trashly was measured to be the AR mobile application with the most desirable criteria. Therefore, it will be used as the main reference app for the development of the team's application.

1. INTRODUCTION

In the previous deliverable it was decided that an Augmented Reality (AR) application was to be built for use in sorting out household recycling. The purpose of this deliverable is to provide design criteria based from the customer needs identified in the client meeting and interpreted in the previous deliverable. The design criteria will be separated into three main categories: functional, non-functional, and design constraints. These criteria will then be applied to some pre-existing apps to aid in benchmarking our app. The table (Figure 1) is provided to rank the customer needs in terms of relative importance, this will be used to help benchmark pre-existing applications.

Number	Needs of the Client	Importance
1	Ability to distinguish between recyclable and non-recyclable items.	★★★★★
2	Software compatible with both IOS and ANDROID.	★★★
3	Ability to scan most household items.	★★★★
4	Easy to use.	★★★★
5	Consider basic recycling regulations.	★★★★
6	Software available in different languages	★★

Figure 1: Client Needs

2. DESIGN CRITERIA

In this section the client needs will be further refined into specific design criteria. Based on the meeting with the client, the needs identified in Deliverable B and some research of similar products on the market the criteria are listed in the table on the next page (Figure 2). These criteria have also been sorted into three categories, functional, non-functional and design constraints. Functional criteria are the criteria which are required to have the application function as intended. Non-functional criteria are additional criteria which do not affect the functionality of the app but are included for other reasons, i.e., accessibility. Design constraints are the constraints that are put in place for the design process, for example the design has a budget of $100.

Number	Client Need	Design Criteria	Numerical Spec
1	Ability to distinguish between recyclable and non-recyclable items.	Can sort out plastics, carboards, metals, and general waste material.	• Extensive database • Extensive search engine • Recycling guide • AR • AI
2	Accessible to the largest possible user base.	App should be developed for both IOS and Android. Also, app should be free.	• Cross-platform • Low memory needs • Large location range • Attractive UX
3	Ability to scan most household items.	Has the ability to detect and sort most	• Extensive database • AR • AI
4	Easy to use.	Can scan items quickly and effectively.	• User-friendly • No or non-imposing ads
5	Consider basic recycling regulations.	Default to Ottawa regulations or have users enter in basic regulations.	• Database sources from city regulations and/or is updated by users • Newsfeed for updates • Notifications • Scheduling
6	Available in different languages.	English and French.	• Has a language setting

Figure 2: Design Criteria and Numerical Spec.

Functional Criteria	Non-Functional Criteria	Design Constraints
- Can distinguish waste from different sorts of recyclables - Considers basic recycling regulations - Can scan most household items	- Should be developed for both IOS and Android. - App should be free. - App should be easy to use. - Available in English and French.	- Budget ($100) - App cost (FREE) - Scanning Time (seconds)

Figure 3: Functional, Non-Functionla Criteria and Design Constraints.

3. BENCHMARKING

After considerable research we discovered three main applications that provide recycling education, and which help users recycle. In this section, we will compare Recycle Coach, Trashly and iRecycle under different specifications. At the end, using these specifications and our importance scale, we will get the total for each application and we will use this information to set the criteria for our solution.

Specifications	Recycle Coach	Trashly	iRecycle (Vancouver)
Company	Municipal Media Inc.	EPAM Systems	iRecycle, Khashayar Mortazavi
Cross platform usage	Android and iOS	Android and iOS	Only Android
Memory	27.07 MB	21.53 MB	9.24 MB
Reviews	4.5	4.3	N/A
Downloads	~100 000	~1000	~1000
Ads	No	No	No
Donations	No	No	Uses donations to iRecycle for planting trees
Location/Range	Canada and United States	United States	Greater Vancouver Area
Database	City's database	City's database, location data provided by Earth911, data collected by team	City's database, user submitted data, and data collected by team
Map	Uses Maps (iOS) and Google Maps to find collection day and pick-up details based on location.	Uses Maps (iOS) and Google Maps to find nearby recycling centers, provides recycling info, as well as directions.	Google Maps: can filter for garbage, containers, paper, and compost. Can get directions.
Search Engine	No	Items, food, and furniture: if and how to recycle	No
Game	No	Educational game to learn which items goes in which bin	No
Recycling Guide	Tips and tricks for recycling.	Recycling information, building own sustainable recycling methods, disposal recommendations, and landfills alternatives	Guidelines for each type of bin (containers, papers, and compost)
AR	No	Yes	No

AI	Yes	Yes	No
User can report issues with bins	Yes	Yes	Yes
User can add bin locations	Yes	No	Yes
User can upload pictures	No	Yes	No
User can track own recycling progress	Yes	Yes	No
Notifications	Custom reminders for emergencies and non-emergencies (recycling events) by push, email, and/or SMS	No	No
Schedule	Calendar for whole year with recycling events in community	No	No
Newsfeed	Yes	No	No
Language setting	English only	English only	English only

Figure 4: Benchmarking similar products using design criteria.

Specifications	**Importance**	**Recycle Coach**	**Trashly**	**iRecycle (Vancouver)**
Cross platform usage	3	3	3	2
Memory	3	1	2	3
Reviews	4	3	2	1
Downloads	3	3	1	1
Ads	4	3	3	3
Donations	4	1	1	3
Location/Range	3	3	2	1
Database	5	2	2	3
Map	4	2	3	2
Search Engine	5	1	3	1
Game	4	1	3	1
Recycling Guide	5	2	3	2
AR	5	1	3	1
AI	5	3	3	1
User can report issues with bins	4	3	3	3
User can add bin locations	4	3	1	3
User can upload pictures	4	1	3	1

User can track own recycling progress	4	3	3	1
Notifications	4	3	1	1
Schedule	4	3	1	1
Newsfeed	4	3	1	1
Language setting	2	2	2	2
Total		195	**198**	149

Figure 5: Benchmarking using importance values of similar products.

After benchmarking these three applications, Trashly comes closest to a representation of the solution to our problem and can be used as a starting point for the development of our own recycling application.

4. CONCLUSION

There are many applications that helps users recycle. Three major applications; Recycle coach, Trashly and iRecylce(VAncouver) were spotted. Through benchmarking Trashly earned the greatest total of 198 making it the application closest to what is a solution to our problem. Trashly will therefore be used as a starting refernece point for the development of our own application. Our application is estimated to score above 198 according to the criteria listed.

REFERENCE:

- *Save your municipality' s recycling program. (n.d.). Retrieved February 08, 2021, from https://recyclecoach.com/*
- *Trashly. (n.d.). Retrieved February 08, 2021, from https://trashly.io/*