

Engineering Design - GNG 1103 [C]

Project Deliverable D

VR/AR for Recycling

Professor M. Majeed

Section C03 – Group 11

Team Members

Sam Barrett	300109196
Laura Chin	300105534
Hongdi Fan	300109379
Seonaid Hair	300114581
Adam Tilley	300108974

Abstract

In this deliverable, each team member came up with individual conceptual designs using the design criteria and target specifications that were found through client needs and outlined in the previous deliverable. Each member then presented the design to the group and a final solution was created using the best aspects from each. This deliverable outlines each individual and final design and were then compared through benchmarking.

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Introduction

The project team has been tasked with creating a product which simplifies and encourages the recycling process by the client, Mitch Bouchard. After the first meeting with the client, the project needs and criteria were interpreted from the client feedback. Then, the needs and criteria were rated on their importance to the project then narrowed down to the most crucial. The most critical criteria were determined to be user friendliness, sorting accuracy, and accessibility; as the client desires the project to be widely available, easy to use, and functional.

To aid and educate consumers on recycling, a mobile application was chosen since mobile apps are widely accessible and typically easy to use. It was also decided that it would be beneficial to incorporate a game aspect to the app to allure consumers to use the app. Benchmarking was then performed on mobile apps to grasp a better understanding of mobile app design. Since there were no apps found which could be directly compared to the desired product; the apps *TOwaste* and *Recycle Nation* were used to benchmark recycling sorting and *Bin the Trash: Recycling Game* and *Have You Herd* were used to benchmark recycling games. *TOwaste* was determined to be the better of the recycling sorting apps and *Have You Herd* was determined to be the better of the recycling game apps.

This document intends to display the individual design concepts proposed by each member and then to determine the final group design concept. Design proposals will focus on the user interface, data base function, waste sorting, augmented reality functionality, and game aspects. Each team member will propose design concepts and the final design concept will be composed of the best aspects of each individual design concept.

Individual Concepts

Laura's Design

The goal of Laura's design was to create a clean overview for people unfamiliar with technology while also incorporating ways to entice more technologically savvy people. The app initially opens to the scanning screen as seen in figure 1. This menu was designed with very little noise to appeal to people who want a simple app for sorting their recycling. They can scan items and even manually sort from this menu. However, people who want more interaction with the app can click on the check box to turn on additional features in the app. The app's interactive mode (Figure 2) will have a leveling system that quantifies the user's recycling habits, a leaderboard to compete against friends, and a menu of educational games. The reasoning for the two different menus is to prioritize usability and user interface by making the main menu easy to use and navigate, but also to increase the fun aspect to encourage people to use the app more.

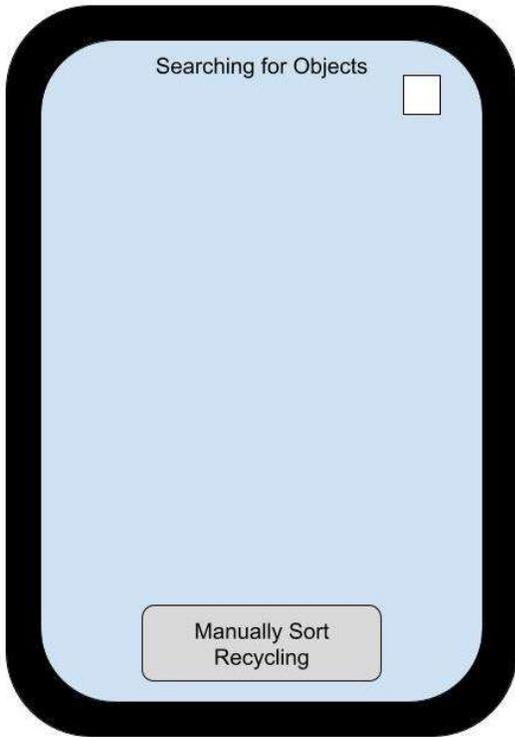


Figure 1. Laura's Design - Base Menu Screen

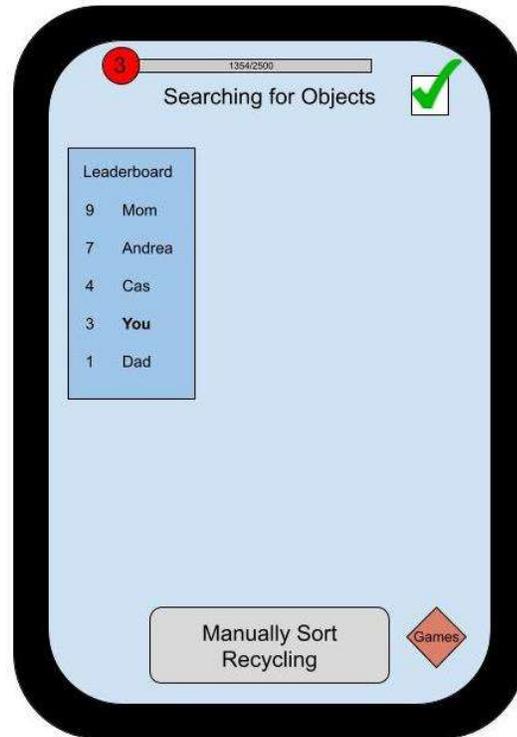


Figure 2. Laura's Design - Interactive Menu Screen

The app has two ways of sorting recycling. The initial window will scan items with the phone's camera and show the colour and symbol of the recycling bin the item goes in, or it will say 'not recyclable' if the item cannot be recycled. If the user's camera cannot identify the item, or the user does not give the app access to their camera, they can manually sort the items with the page shown in figure 3. This page will use a series of multiple-choice questions to find the item the user wants to recycle. The purpose of the two different methods of sorting is to increase the user-friendly nature of the app by allowing the user to simply point the phone camera at an item, to increase accessibility by giving people more options to customize their experience, and to increase accuracy by having a fall back if the scanning is unable to sort the item.

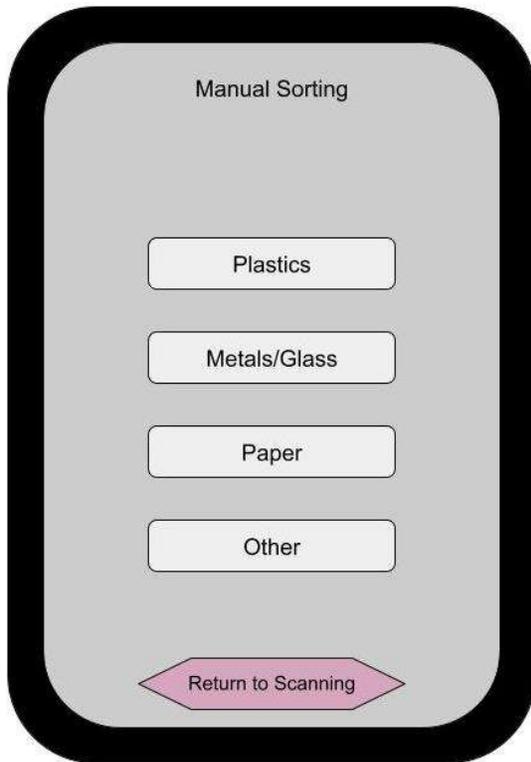


Figure 3. Laura's Design - Manual Sorting Menu



Figure 4. Laura's Design - Game Menu

From the interactive user interface, the user can also reach a game menu (Figure 4) that has a handful of games. Some game ideas have already been proposed. The first game, 'Recycling 2048', shown in figure 5 is the 2048 game, but the tiles are the colours of the different recycling bins and randomly generated images of things that can go into those bins. The goal of the game is to have the user begin to associate the different items on the tiles together and with certain coloured bins so that when the user is sorting recycling, the user can recall the items that go together. The other game, 'Empty the Bag', shown in figure 6, is a game that stores all the items the user has scanned and displays 3 items at a time with a recycling bin. The user must determine which objects go into the bin and slide the recyclable object icon into the bin with their finger. The game will test the users on their sorting knowledge while also incentivizing them to scan and recycle objects with the app. The main objective of the games is to educate people on what items are sorted together and to make the experience enjoyable which will make people want to return to the app.



Figure 5. Laura's Design - Recycle 2048



Figure 6. Laura's Design - Empty the Bag

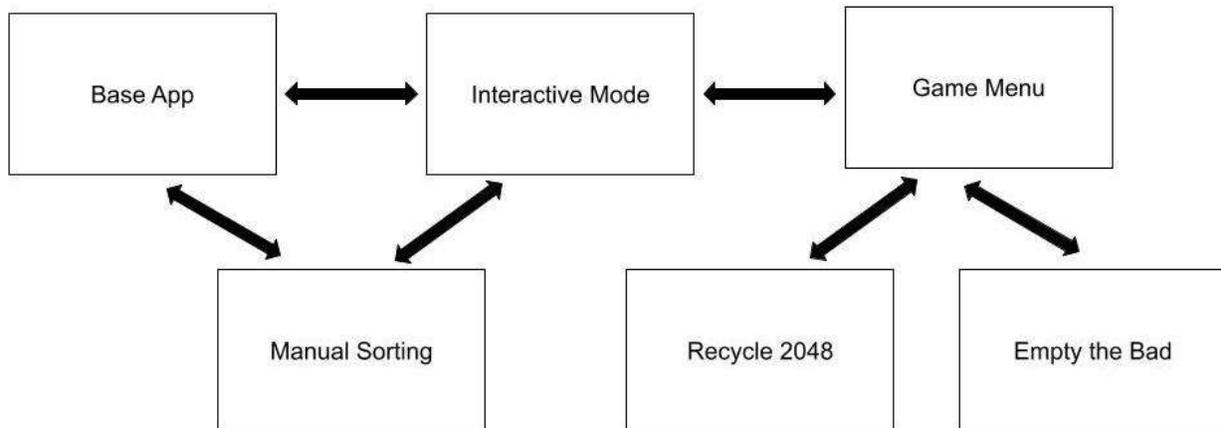


Figure 7. Laura's Design - Flow Diagram of App

The other concept generated was a watch with an appearance similar to a Fitbit as shown in figure 8. The idea could be incorporated into Fitbits or other smart watches. The watch scans the object in the user's hand and determines which recycling bin, if any, it should be placed in. Then, as the user holds their hand over a recycling bin, the watch scans the bin to match it with the

object. If the object and bin do not match, the watch will flash red and make a small sound to indicate that this is the wrong recycling bin. Otherwise, the watch will flash green to inform the user that this is the right recycling bin. The point of this design is to make the product extremely user friendly. The watch needs no input from the user once it is set up and will be able to inform the user quite easily.

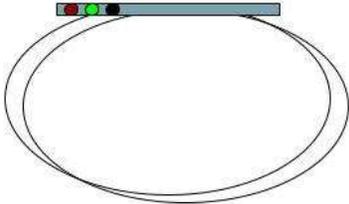


Figure 8. Laura's Design - Scanning Watch

Seonaid's Design

Seonaid created three designs for the final product: an app (Figure 9), a website (Figure 10) and a shortcut on iOS (Figure 11). Each design prioritizes various important needs of the client and facilitates the use as much as possible for everyone.

App

The app (Figure 9) is a cost-effective design that has a basic layout with buttons that lead to various functions including identifying recycling, a map, the leaderboard, an education and news page, and a connect page. The design of the app makes it very easy to use and accessible. The AR camera should make identifying recyclable items as simple as taking a photo. If the AR function cannot register the item, a manual input list can be used to identify the proper recycling bin that the item should go in, which will hopefully lead to an accuracy rate above 95%. The simplicity of the app makes it very aesthetically pleasing and it incorporates the competitive game aspect through a leaderboard which records points from recycling.

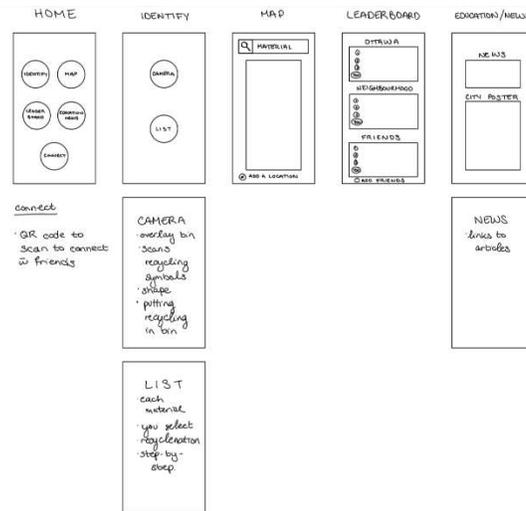


Figure 9: Seonaid's Design - App

Website

The website design (Figure 10) is more accessible to those without phones, particularly children, so the website would have a game page to help teach children about recycling in a fun way. It will also contain a large database with all recyclables and a step-by-step breakdown of classifications to walk the user through the identification of the item and determine the proper recycling bin. The Website will also have a page for special recyclables that connects with a map containing addresses and contact information about the locations where these items can be recycled. The map will also show where recycling bins for standard recycling are situated throughout the city. The education and news page will contain information about recycling and news articles about pollution, While the games page would be for children to help educate at a young age and hopefully influence future generations to be better.

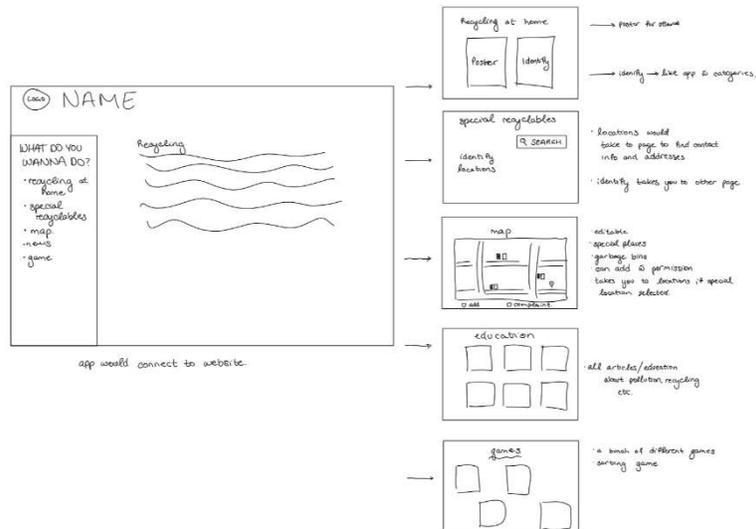


Figure 10: Seonaid's Design - Website

Shortcut on iOS

The final design was a shortcut for iOS (Figure 11) which would increase accessibility because it would be simple for people to navigate to, and it would be a very simple and straightforward solution to recycling. The shortcut will provide a picture of the Ottawa recycling sorting poster on the phone's home screen and then when clicked on it would lead to the phone's camera with an accessory that would be programmed with AR to identify items based on shape and material. This would be a very easy application but would be lacking many of the other necessary design criteria such as a game aspect and education on the subject of recycling.

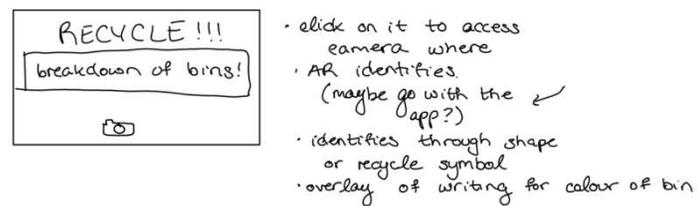


Figure 11: Seonaid's Design - Shortcut

Adam's Design

Adam's design opted for simplicity and user friendliness while trying to incorporate aspects from mobile games to encourage continuous usage. The application opens to the camera feature, as seen in figure 12, with a division into 4 different sections: Sorting, AR/Camera, Leaderboards/Social, and Education. With the permission of the user, the camera scans the area in front of it, searching for an object to be recycled. Using the proper sorting software, the object is identified, and the app presents instructions on its proper recycling procedure, whether it be under compost, plastic recycling, garbage, etc. The user is then given an option to transition to the game portion where the item is rendered into a 3D image and generates the proper bin in 3D. From there, the player may virtually launch the object into the bin to receive in-game points.

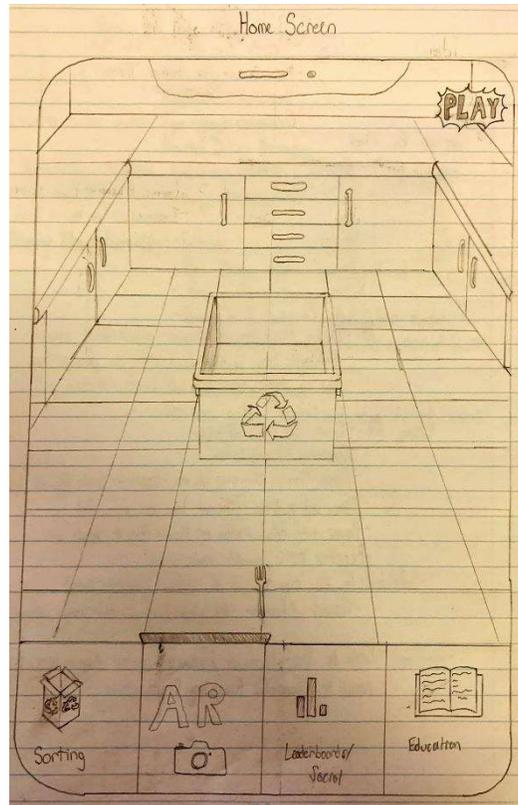


Figure 12: Adam's Design - AR Camera

The “Sorting” section utilizes multiple different methods to determine the item’s material and its proper disposal procedures. The first method involves a search bar at the top of the screen, allowing the user to quickly find the exact item that they wish to discard, given they know the exact name of their material. The second method is a prominent display of common and popular household items that are thrown away. This makes for an efficient use of time, negating the need to determine the item’s composition or find it through a search engine. The final method utilizes a descriptive flowchart, depicted in figure 13, to guide the user to the most probable material. Though not as quick as the previous two methods, this should improve the accuracy of recycling should the person be uncertain of the type of material or its proper place of disposal. Additionally, if the item possesses a number within the recycling symbol, the user may simply input that number after pressing the “#” at the top right of the screen to receive immediate instructions for how it should be recycled.

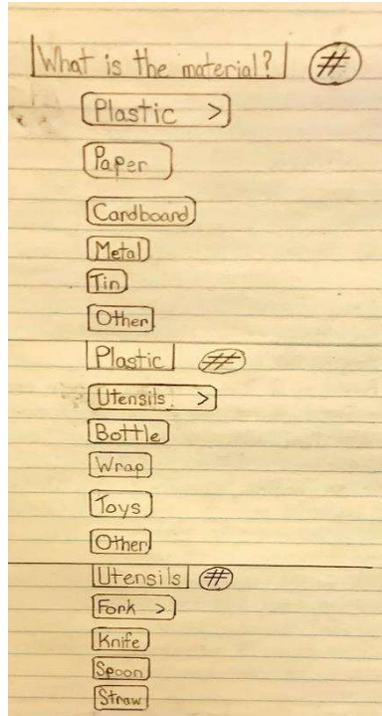


Figure 13: Adam's Design - Description Flowchart

The “Leaderboard/Social” section incentivizes people to constantly use the application by rewarding them with points for recycling which can be used in a ranking system against friends and in a regional and/or global leaderboard. The leaderboard is divided between the points received in the 3D game, connected to the AR/Camera section, and in the 2D game, connected to the Sorting section. Incorporating other redeemable items through this point system such as background colours or player icons may also prove to be beneficial.

This application will include two similar games, divided into 3D and 2D, intended for the AR feature and the Sorting section respectively. The 3D game mimics a type of paper toss game where the object that the user scans is rendered in 3D and may be thrown into the recycling bin for points. To reduce points exploitation of scanning the same object multiple times, players will be limited to only using a specific object once per day. For example, if the player scans a plastic fork for gameplay, they may not use another plastic fork until the next day. The 2D game falls into a sorting/matching game where multiple items and multiple bins are generated on the screen. To receive points, the player must correctly sort each item into the proper bin, otherwise they lose points.

Finally, the “Education” section provides links to trusted and peer-reviewed sources on the impacts of recycling and other related topics, as well as links to charitable recycling organizations. It will also include a newsfeed on recent related issues, events, and breakthroughs that the user may be interested in. Additionally, a few paragraphs will be dedicated to the development of this app and each group member’s thoughts on the impact of pollution and benefits of recycling.

Sam's Design

User Interface

Sam put forward three different possible user interface designs (figure 14). The first design follows a similar layout to the mobile game "Clash Royale", while the second design is a simple branching tree layout, and the third layout involves navigating the app using a side bar with icons representing different categories or functions. The first design opens on a home page at the center which contains information on the user rank, score, a link to the games, and app settings; swiping to the left leads the user to the AR scanner function; swiping to the right leads to a page containing information on recyclables to aid the user in sorting their waste if the scanner malfunctions. This layout is simple to follow and allows easy access to any of the application's functions. The branching tree format is a simple design, featuring a home menu with links to submenus or functions such as the AR scanner. With fewer pathways this design is simple and easy to follow; however, it can become convoluted if there are too many pathways which will negatively impact the user-friendly nature of the app. The final design opens on the home page and has a bar at the bottom of the screen with icons representing the home page, recycling information, games and the AR scanner; the bottom bar with the icons linking the different pages remains there regardless of the page it is currently on. This design allows the user to quickly access any part of the app using the icons at the bottom of the screen.

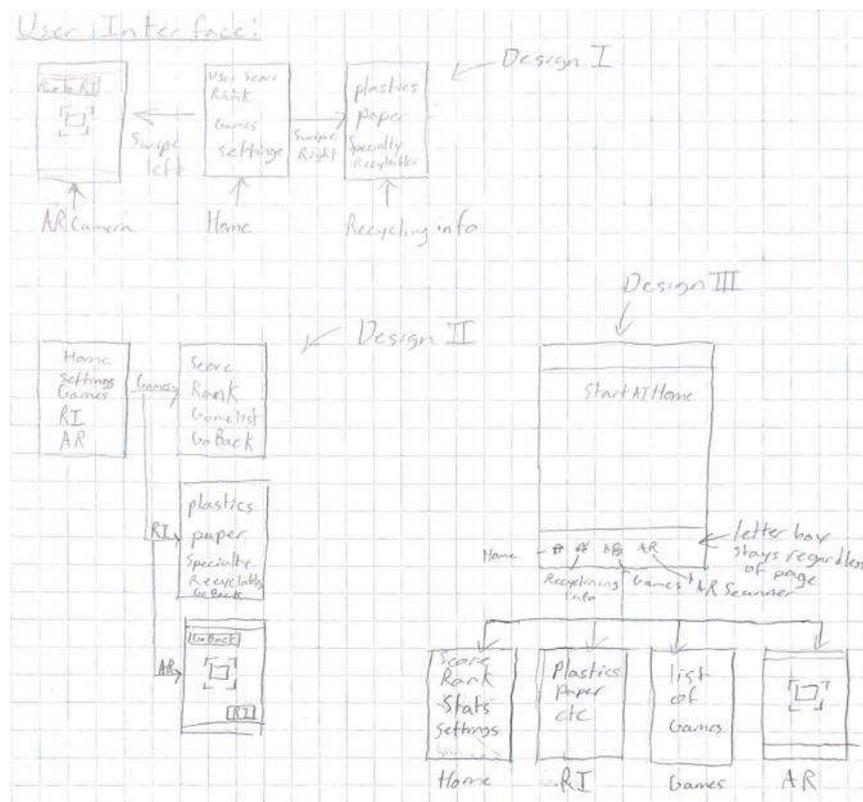


Figure 14: Sam's User Interface Designs

Databases

Sam's design involves a database containing recycling information and user statistics. The app should provide information on which plastic can be recycled in a municipality based on the recycling number on the item, since it is not always clear which plastics are recycled by the municipality. The database should also have an area to find information on misleading household items. For example, milk cartons are a combination of paper and plastic, depending on the municipality they are sorted either as paper or as plastic. Since plastics containing food waste often need to be cleaned to be recycled, it is important for the app to show the user how to effectively clean plastics to be recycled. The app should also contain information on how to dispose specialty recyclables such as batteries. More general information on recycling can be divided by material such as plastic, metal, glass, paper, and organic waste.

The app should store user statistics both for the game aspects and for metrics on recycling to measure the impact of the app. The app should store data on the users score which indicate the users use of the app and their respective ranking based on their score, incentivizing the use of the app through global or local rankings. The app should record the number of items scanned by users as well as the number of recyclables scanned by the app, documenting the number of items properly recycled because of the help of the app.

Games

Sam's design for games focused on educating the user to effectively recycle or reuse items to reduce waste. The first idea for games is to have craft ideas to reuse common household waste reducing the strain on waste treatment facilities. The second concept is to have logic-based puzzle games to educate users on sorting waste. The first of which was a maze game where the player was given limited moves to navigate a maze collecting items and depositing them in the appropriate bin to be recycled; the second being an "ISPY" style of game asking the player to find items based on the bin they would be sorted into; the last game being a puzzle game linking recyclables to their associated bin.

The rewards for completing the games in Sam's design are aesthetic changes to the user's user interface such as colour changes or designs for the background. The aesthetic changes may be unlocked via an in-app currency accumulated by playing the games or scanning recyclables. It may also be possible to unlock new games from the in-app currency.

AR Camera Sorting

Sam's design concept focuses on the AR scanners function and ability to communicate with the user. The first idea is to identify the material of the object through analyzing the opacity and reflectivity coefficient of the object; typically, metals would be highly reflective and opaque; paper materials would likely have a low reflectivity and be opaque; plastics come in a wide range of varying opacities and reflectivity, so they would require additional information. The second scanning function would scan the bar code on the object then determine the bin based on the code. Since barcodes are already used to retrieve information on the product, the code could be used to identify the object, then based on the in-app data the object would be sorted to the appropriate bin. User feedback could be used to ensure the accuracy of the data. To indicate the correct bin, the borders of the app will change colour. As a default setting blue would indicate

plastic, metal, and glass; green would indicate compost; grey would indicate paper; and black would indicate garbage. The colours could be changed in the user settings as the bin colours may change by region.

Hongdi's Design

The app uses the phone's camera when it is opened and instructs the user to scan the object that the user is trying to recycle with a written message. The scan will determine if the object is recyclable or not. If it is not recyclable it informs the user that the object is not recyclable and tells the user where the object belongs instead (with a written message). If it is recyclable, the app determines where the recyclable object belongs (plastic, paper or other). It also directs the user to the nearest place where they can recycle the object. The directions are given using either a map with "GPS" directions (Figure 15) or it allows the user to use the camera to have the app point the user in the correct direction. It is possible that the app can have both functions and let the user choose between them. After the user arrives at the location where they can recycle the object, the app lets the user know which bin the recyclable belongs in by displaying some text. The app can also clarify what the recycling bins look like, what colour they are or what kind of labels could be found on the bin. The app could also have a scanning option to scan the bins and help the user determine which kind of recycling bin it is.

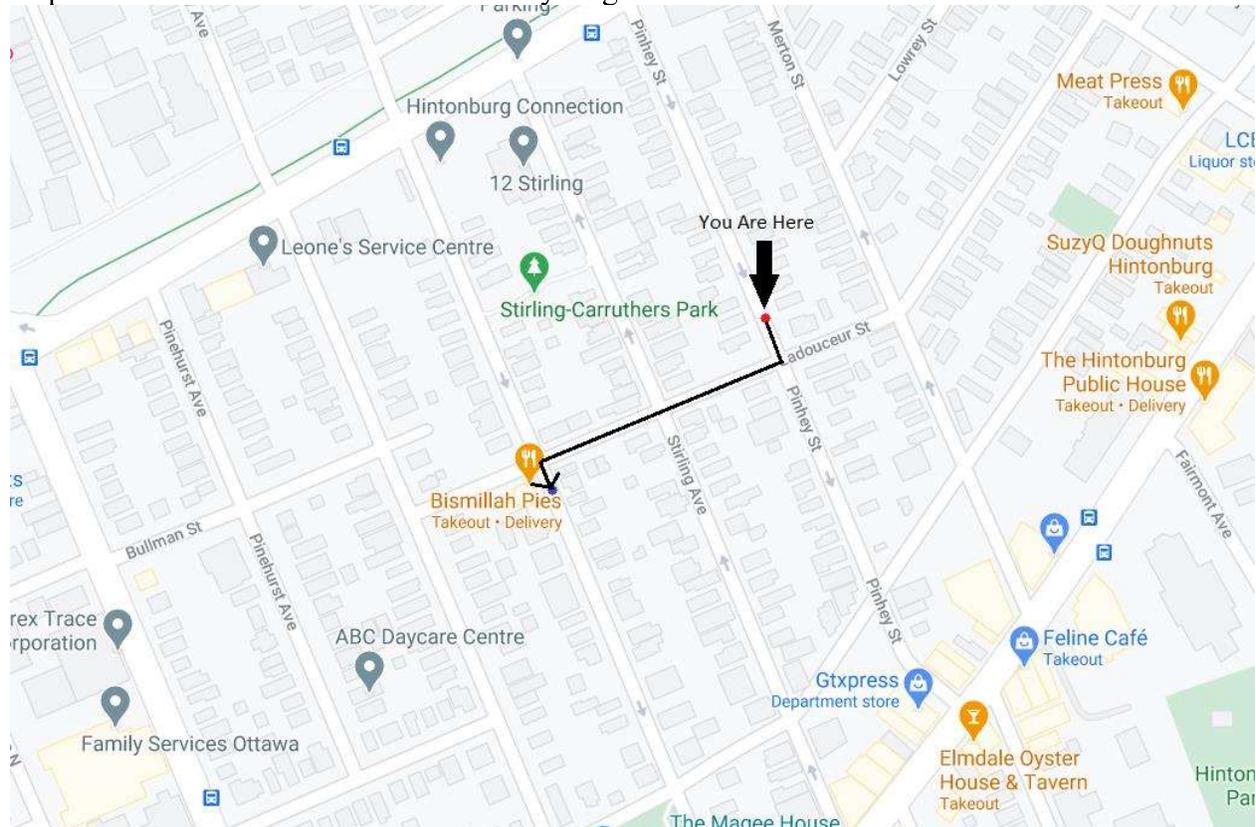


Figure 15. Map View

Final Concept

Analysis

The most important factors to consider when analyzing and comparing each of the individual ideas are the categories identified in the design criteria: Accessibility, User Friendliness, Accuracy, Cost Effectiveness, Creativity, Aesthetics, Fun, and Education. Determining the best design for each category requires an objective analysis of each individual design and deciding which one fits each criterion best. A table providing a numerical rating system for each design is included in table 1.

Beginning with Accessibility, Laura, Seonaid, Adam, and Sam's designs all provided analogous means of access, enabling the app to be available to and cater to multiple demographics. Regarding Hongdi's design, with fewer specifications comes fewer drawbacks, creating a general design without restricting those with technological handicaps such as file space or minimum experience with complex apps.

Secondly, comparing User Friendliness throughout the individual designs produces varied results. Seonaid's design, though compounded with a plethora of ideas, may introduce a sort of "Sensory Overload" for those simply looking to scan and recycle, though this can be said about each design with decreasing intensity. In order of Seonaid, Adam, Sam, Laura, and Hongdi, the degree of simplicity with its usage increases. Regarding Hongdi's design, similar to the Accessibility category, fewer non-functional criteria leads to a simpler design, improving the user's ability to navigate and use the app properly.

Thirdly, the recycling accuracy of the app seemed to be consistent throughout since each design included a scanning method and most designs employed a method to narrow down the material manually and provide recycling instructions from there. Unfortunately, Hongdi's design did not provide enough detail on how the app may accomplish an accurate object identification, nor did it mention a manual sorting method. Ideas that improved the app's accuracy include an object recycling database and the manual input of the material's description and the recycling symbol's number.

Fourth is Cost Effectiveness which is consistent throughout each idea as designing an app, website, and/or program is relatively cheap if the time of the programmers is not charged and should not exceed \$100, assuming the budget is not wasted on unnecessary additions to the project. The most expensive part of all the designs would be the servers required for internet connectivity which every app will employ.

Next is Creativity, a beneficial aspect varied between each design. Aiming for concepts that keep the user engaged, several ideas were proposed. Sam's game ideas incorporated educational aspects of recycling such as a crafts section, providing creative solutions to reusing at home waste to help reduce the volume handled by waste treatment facilities. Another was a puzzle game involving a maze, limited steps, and the goal of sorting materials into their respective bins. Other creative ideas included a watch that scans the material and bin when waved over it and an iOS shortcut to quickly access the phone's camera with a programmed AR material detection

software. These ideas not only help to capture the user's attention, but also helped develop more ideas for the app.

Another category is Aesthetics, engaging the user with a simple yet captivating design. Adam and Sam's designs provided good examples of how the app should look. Starting with the home screen, minimal buttons are displayed to immerse the user in the camera/AR experience and important features of the app are divided into a couple of sections, accessible by swiping the screen left, right, or down. Subsequent categories such as sorting or education, depicted by their icons and a caption, are organized to prominently display their functions without overcrowding the screen.

Penultimately is the Fun category, focused on engaging with the user and to help encourage them to return daily for continuous use. Some ideas to achieve this focus include Sam and Laura's designs on minigame aspects involving logic puzzles and sorting games to test their knowledge on what they already know and what they have learned through the app. These may also be used to measure the effectiveness of the app. Adam's idea involving a points system implemented into the games and the act of physically recycling incentivizes the user not only to replay some of the games, but also to use the app while recycling to accumulate as many points as possible.

Finally, the Education category hopes to teach users about the environment and the impact of recycling (or lack thereof) around the world. Ultimately, the goal is for as many people as possible to recycle properly without the use of a scanning device or instructions. Each design implemented this effectively in the form of links to related articles, providing a newsfeed on recent information in certain fields, introducing crafts to reduce at home waste, and even providing a link to charitable organizations.

Overview of Final Design

The final design was created using ideas from the individual concepts and adapting or adjusting them to better fit the client needs. It was decided to create an app (*Figure 15*) and a website (*Figure 16*) to increase accessibility for all. Additionally, both platforms would provide different strengths that when paired together further met the client's needs. If time permits, both the app and website will also implement a bilingual option to further expand accessibility.

The App

The home screen of the app was created with Adam's design idea in mind, it opens to the AR Camera and increases the ease of use and it has a very aesthetically pleasing simple look with few buttons on the bottom of the screen. Transitioning between pages is done with the buttons on the bottom of the screen or by swiping left, right or down on the home screen, taking inspiration from Sam's first design idea. Swiping left goes to the Education page where links to articles and information regarding recycling and the benefits can be found. There will also be a link to the website for more information and there will be a button to go to the Fun Facts page with common information many people do not know and recycling statistics.

Swiping right once goes to the Leaderboard, where there will be three categories, inspired by Seonaid’s design: City, Neighbourhood, and Friends. The City and Neighbourhood categories will contain every user within a certain distance, and the Friends category will contain every person that the user has connected with through the Connect page. The connect page was adapted from Seonaid’s design to have an identifying code, such as a QR code, that can be scanned through the AR Camera to add other users as friends, it will also contain a unique identifying username that can be manually typed in to add friends. A leader board will have a list of all friends that have been added and their scores in the app. Swiping once more to the right goes to the Games page where all games for the app version will be available. These game ideas came from Sam, Laura and Adam’s designs and consist of a maze game, a 2048 recycling version, a sorting game, a 3D AR game and more. These games will gain points that can then be redeemed for rewards, like Sam had suggested, such as player icons, new colour schemes throughout the app and bragging rights.

Finally, the last page that can be accessed is the manual sorting page. This idea was consistent through each individual design and Adam provided a good breakdown for initial categories on the manual sorting page including metals, cardboard, glass, plastics, etc. These buttons would then take the user through a step-by-step breakdown to best identify the item for the correct bin and there will be a link to the municipality recycling page for further help if needed.

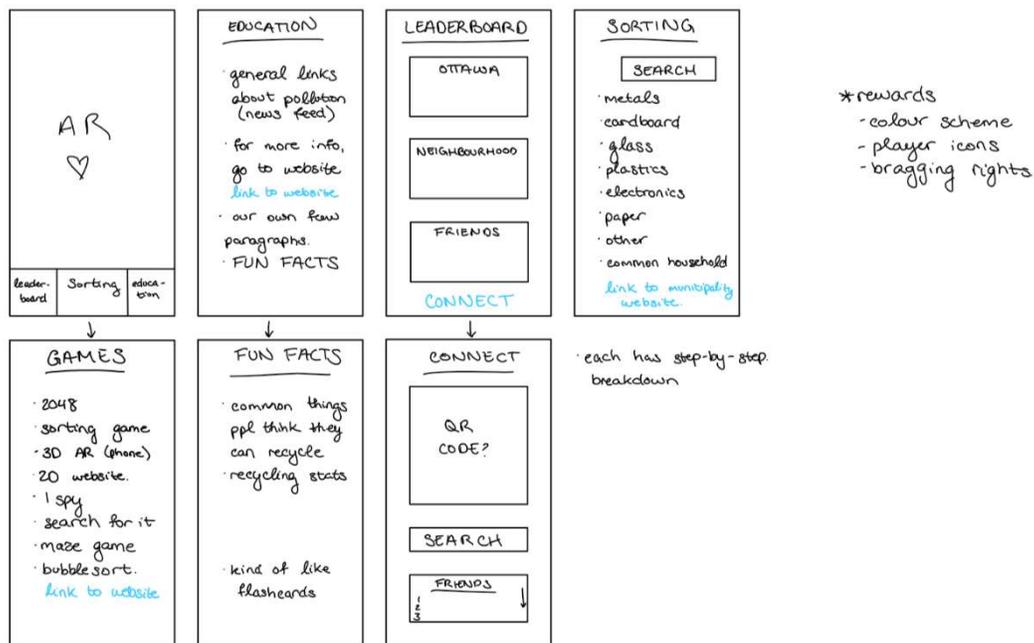


Figure 16: Final Design – App

The Website

The website (Figure 16) was designed to increase accessibility to users that did not have cell phones, such as children, and to increase awareness and education. The website will be designed

very similarly to the app with a Manual Sorting page, Education/news page, and a Games page. There will also be a Map and a Discussion Forum on the website. The Map will contain locations where certain recyclables can be dropped off that cannot be put in regular recycling bins, such as batteries, clothing, electronics, etc. When these locations are selected, it will provide the address, contact info and operating hours. The Discussion Forum will be available to all users to read, but to post and participate in discussions, an account will have to be made, but this account will also come with more benefits, such as it will allow the user to connect the website with the app to transfer points across for rewards.

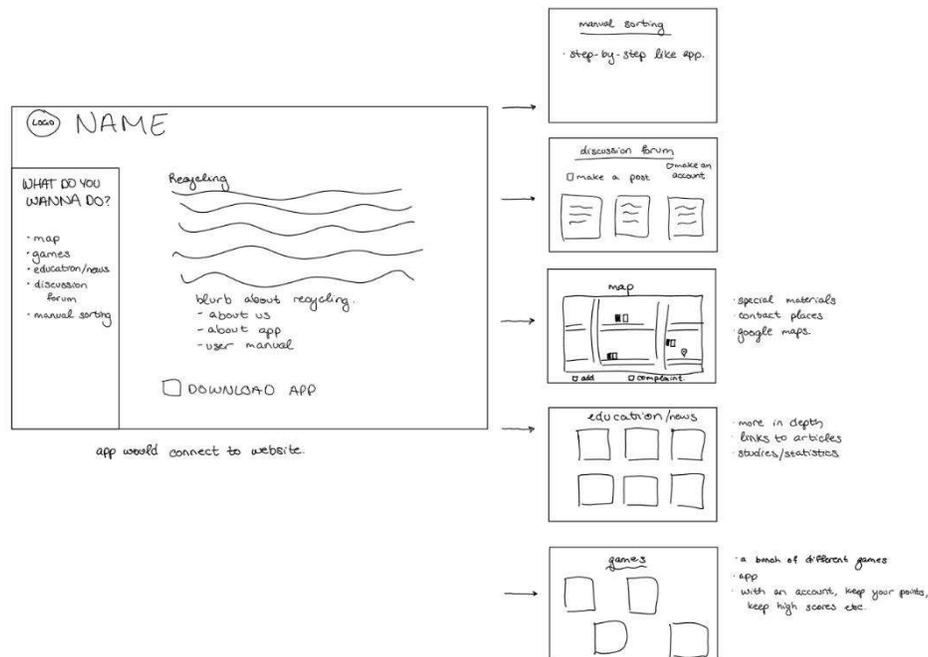


Figure 17: Final Design - Website

With both the app and the website design, accessibility, accuracy, education, and fun can be achieved more successfully and both of the designs are aesthetically pleasing, cost effective, creative and user friendly. These are all the most important client needs to achieve the best result.

Target Specifications

The chosen design was created with the best features from the individual designs as seen in figure 17. This choice caused the design to have many advantages as it incorporates the advantages from the individual designs. However, while choosing the best features from each design was done to limit the drawbacks for the final design, some drawbacks from the individual designs were carried over and new ones were created.

The final app boasts many advantages. The most important advantages that the app provides are the simple interface and the plethora of activities to entice users to return to the app. The goal of the app is to promote recycling as a way of life and to ensure people are recycling properly. To ensure the app functions towards its goal, it must encourage its users to return almost daily. The idea is to promote this mindset by making the app simple to use and navigate while

simultaneously encourage constant usage through the social and gaming activities. Similarly, to increase the accessibility, the final design has been broken into an app and a website that interconnect to offer services to people both on and off their phones. This will not only decrease the size of the app to make the app more available to people, but the website will be another option for people who do not have phones compatible with the software or for people who do not have phones.

However, these advantages also bring a few drawbacks. The main drawback in the ambitiousness of the design. The many different features and the cross between a phone app and website will require large amounts of time and talent. Many of the creators are unfamiliar with coding and will have to learn much of it as they work on the project. Furthermore, the large amounts of ideas could prevent any single part of the app or website to work especially well. The final project's lack of polish could lead to undiscovered bugs or the program crashing. This could decrease the user-friendliness of the app and generate a lack of desire to use the app amongst users. Similarly, even with the split between app and website, the many features in the app may still cause the app to be much larger than the targeted 20MB size and even the 200MB size.

Since the project is very ambitious, the plan is to focus on key parts of the application and expand to the other features as time permits. Focusing on key aspects of the application will help ensure that those sections work as intended and will provide the team with more time to test and check for bugs. The main focuses are the AR camera, the opening interface, and the manual sorting since those are the main functions of the app, and bereft of those the app cannot fulfill its purpose. The secondary focuses are the games and leaderboard since those will endear people to the app and encourage constant usage which is another main desire of the app. Finally, the education portion will be the last to be implemented since education, while important, is not the focus of the app. The website will be generated along with the secondary focuses since many assets from the app could be reused with the website and the website will offer more specialized methods for dealing with recycling. By following the above priorities, the project should retain its most important aspects even if the time constraint prevents every feature from being explored in depth.

Many of the advantages of the final design are advantages because they incorporate and exemplify the target specifications and design needs determined in the previous deliverable. The main features prioritize the accessibility and user-friendly requirements and are planned to incorporate the accessibility features specified in the previous deliverable, including bilingualism of Canada's two national languages and colour-blind accessibility features. The focus on the primary features will ensure that the other most important target specifications from the previous deliverable are met, ensuring the app functions as needed. The design will adhere to the agreed upon design criteria while also exploring additional features as later goals.

Table 1. Benchmarking Designs

Design Criteria	Applications					
	Laura's app	Seonaid's app	Adam's app	Sam's app	Hongdi's app	Combined app
Accessibility	4	4	4	4	5	6

User Friendly	4	1	2	3	6	5
Accuracy	6	6	6	6	1	6
Cost Effective	6	6	6	6	6	5
Creativity	1	3	4	5	2	6
Aesthetics	2	4	5	3	1	6
Fun	5	2	4	3	1	6
Educational	NO	YES	YES	YES	NO	YES
Total	131	121	139	139	100	177

*Some ratings are based on subjective group interpretations of designs

Conclusion

After reviewing each individual design, it has been decided that the final design of the app will combine the advantages of each individual team member's design. Unfortunately, some of the disadvantages of each individual design remain and some new disadvantages were created. The main disadvantage of the combined design is that it has so many features that will take a lot of time and effort to create. Even if the team member's app design skills are sufficient to design the app, the amount of time spent designing the app instead of reviewing and editing it could result in the app being poorly optimized, whether it is because it is visually unappealing, unreliable or simply buggy. The final app's combined advantages are shown in the table above (table 1) where the combined app's ratings are also compared to the individual team member's app design ratings. The final design will also include fun educational components, a website, and user-friendly functions. The website is designed similarly to the app with its sole purpose to increase recycling assistance to users who do not have cell phones or mobile devices such as children. The final app's design will also try to include specific user-friendly functions such as a colourblind mode and a bilingual option.