

# GNG 1103

**Deliverable H: Prototype III and Customer Feedback**

## **Group 13**

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## **Introduction**

For the last deliverable, the decisions and results of the first prototype were discussed where the main subsystems - the scanner, the UI, and the leaderboard - were first introduced. This deliverable emphasizes on the decisions and results of the second prototype which is built upon the first prototype. The purpose of this prototype is to use the feedback that the client provided and make improvements and modifications to our product. The team performed prototype tests to obtain results and collected feedback from different individuals in order to determine the state of the application.

## **Prototype 3 Testing Plan**

### **Prototype 3 Objectives – the ‘Why’**

*What are the **specific** test objectives?*

The objective of the third prototype is to finalize the application. This prototype test is necessary to ensure that the client's past feedback is used for the development of the application and that his needs are fulfilled. The application will work properly; every page of the application will work effectively (user interface page, leaderboard page, manual search page, scan page, options page).

*What **exactly** is being learned or communicated with the prototype?*

Prototype 3 focuses on building upon prototype 2. Everything must be completed in this prototype.

*What are the possible types of results?*

As previously mentioned in Deliverable F and Deliverable G, there could be many possible results. The results could be satisfactory or unsatisfactory. At this point of the project however, the results will most likely be satisfactory since a lot of feedback has been obtained from previous deliverables which have been applied in the application.

*How will these results be used to make decisions or select concepts?*

Since this is the final prototype, the results will determine whether the team needs to exclude a concept if it has not been completed in time.

*What are the criteria for test success or failure?*

The criteria for test success would be to obtain positive feedback from the individuals. If the feedback provided is negative, then it would result in failure. In addition, another criteria for success would be that everything that the client required is working in the application. If

something is not working properly and is not excluded from the application, then it would result in failure.

### **Prototype 3 Process - the 'What' and 'How'**

*Describe the prototype (e.g. focused or comprehensive) and the reason for the selection of this type of prototype.*

This prototype is intended to be a comprehensive prototype that assimilates the functional subsystem prototypes created for Deliverable G. After determining what features were possible independently, this comprehensive prototype will be the final version of the application.

*Describe the testing process in enough detail to allow someone else to build and test the prototype instead of you.*

The testing process involves assessing if the current prototype meets the previously established design specifications. To create and test the comprehensive prototype, the tester must have access to unity and a basic knowledge of unity and C#. After completing the prototype, the unity project is then to be assessed against the design metrics to determine how well it meets the standards outlined in Deliverable C.

*What information is being measured?*

The information being measured through testing is mostly qualitative or yes/no answers.

*What is being observed and how is it being recorded?*

The purpose of the tests is to observe if the intended features are functional and how well the prototype satisfies the client's needs. The results for the comprehensive prototype are to be recorded in a table comparing the performance of the prototype to the design metrics.

*What materials are required and what is the approximate estimated cost?*

The prototype does not require any physical materials associated with it. A working personal computer and unity engine are the only required materials.

*What work (e.g. test software or construction or modeling work or research) needs to be done?*

The prototype will require team members to do research on how to implement the features of the application using Unity. Research on how to complete the final functionalities of the application is also required.

## Prototype 3 Schedule - the 'When'

How long will the test take and what are the dependencies (i.e. what needs to happen before the testing can occur)?

Prototype 3 must be in its final stages in order to test it. The tests will be performed during the team meetings. An updated Gantt chart for Deliverable H was created to ensure that the testing process will take place.

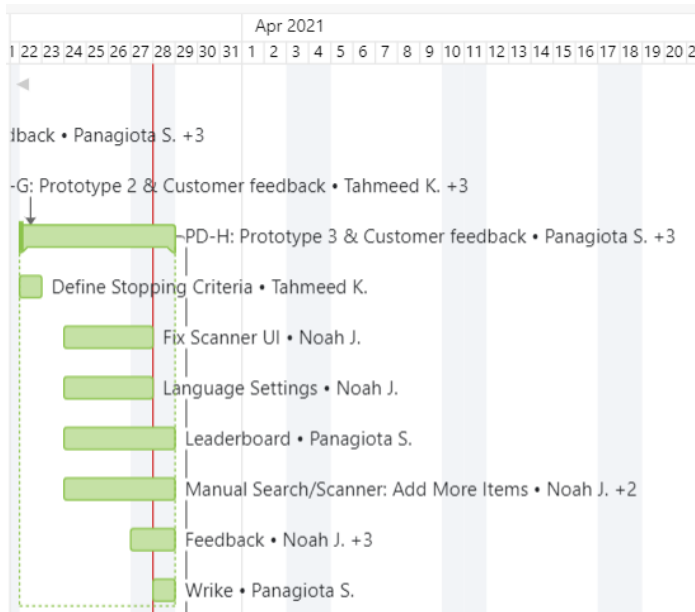


Figure 1: Gantt Chart

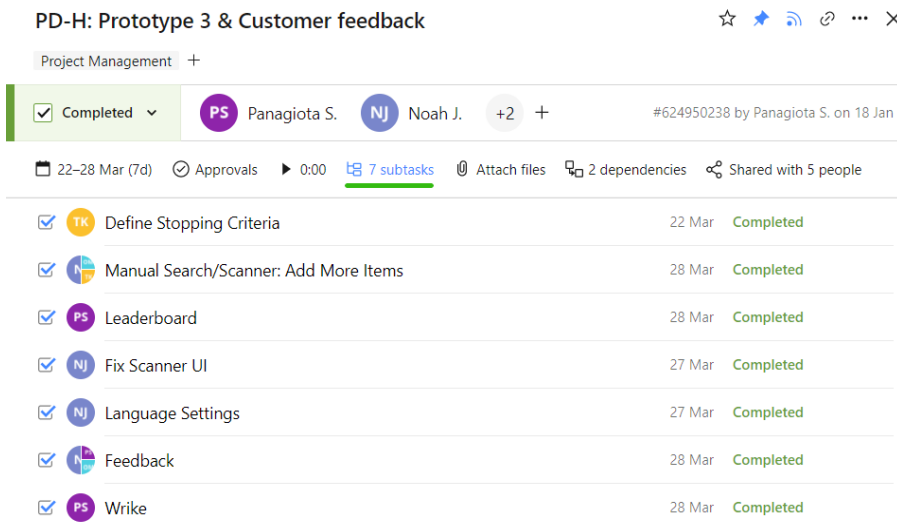


Figure 2: List View

When are the results required (i.e. what depends on the results of this test in the project plan)?

The results are required by March 28th, the day Deliverable H is due. The results obtained from prototype 2 will help us develop and finalize the final prototype. Therefore, prototype 3 depends on prototype 2.

## **User Interface**

This prototype focused on adding the intended features and scripts to incomplete interface elements. Progress was made on the user, manual search, scanner and options scenes.

When an item is identified on the scanner scene, the elements change color to the color of the bin the scanned item should be placed in. The two pop-ups on the side of the scene now correctly display the bin to place the item in as well as a functioning button that opens the item's database page.

All the buttons have been added to the manual search page and more items have been added to the search bar and database. The app now stores variables for individual types of item totals such as plastic and paper. These variables are displayed on the user scene.

The english to french translation button switches the language on all scenes simultaneously and remembers the language between sessions. Each text element requires a key, english text and french text elements in order to be translated. Currently, the prototype only translates a portion of the text elements. The remaining yet to be translated text elements are to be completed in the near future.

The options page still has two uncompleted buttons, replay tutorial and privacy settings. Our group intends to create a video tutorial explaining how to use the app once the app has been completed. This video will be played when the replay tutorial button is tapped. The privacy settings button is dependent on the leaderboard cloud, thus no progress could be made on it this week. It is possible this button will be replaced with something else in the event that the progress on the leaderboard cloud does not accelerate.

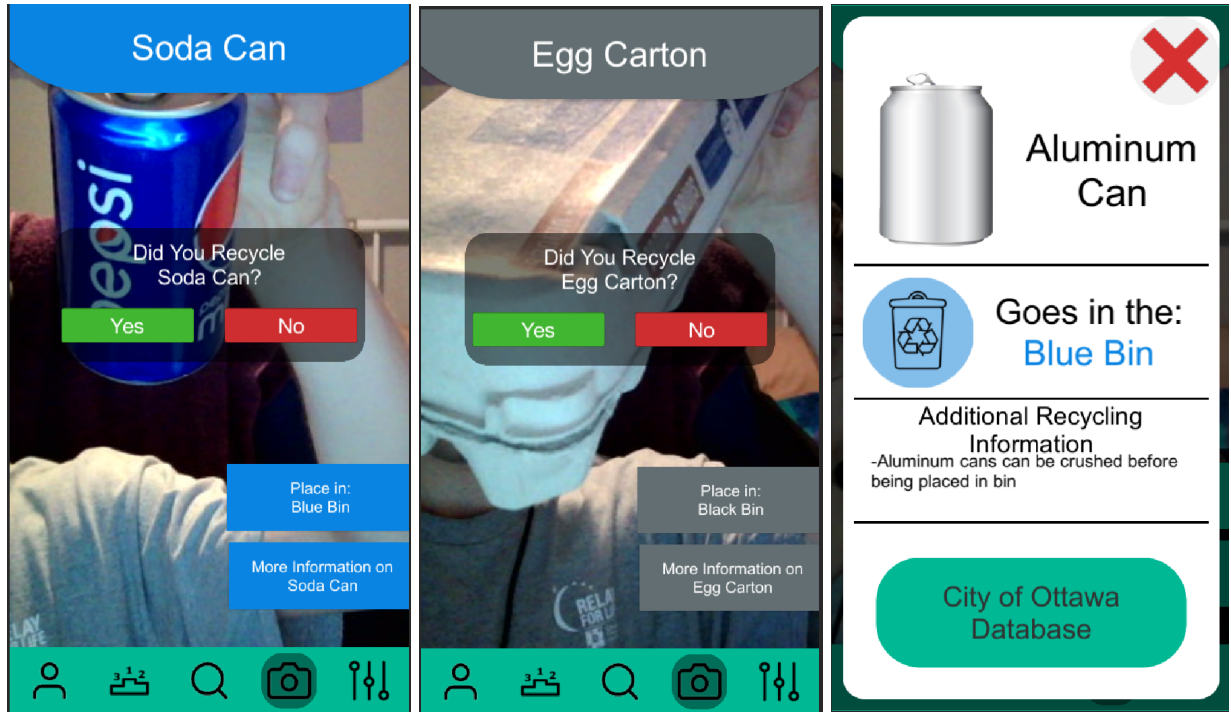


Figure 3: Scanner Scene

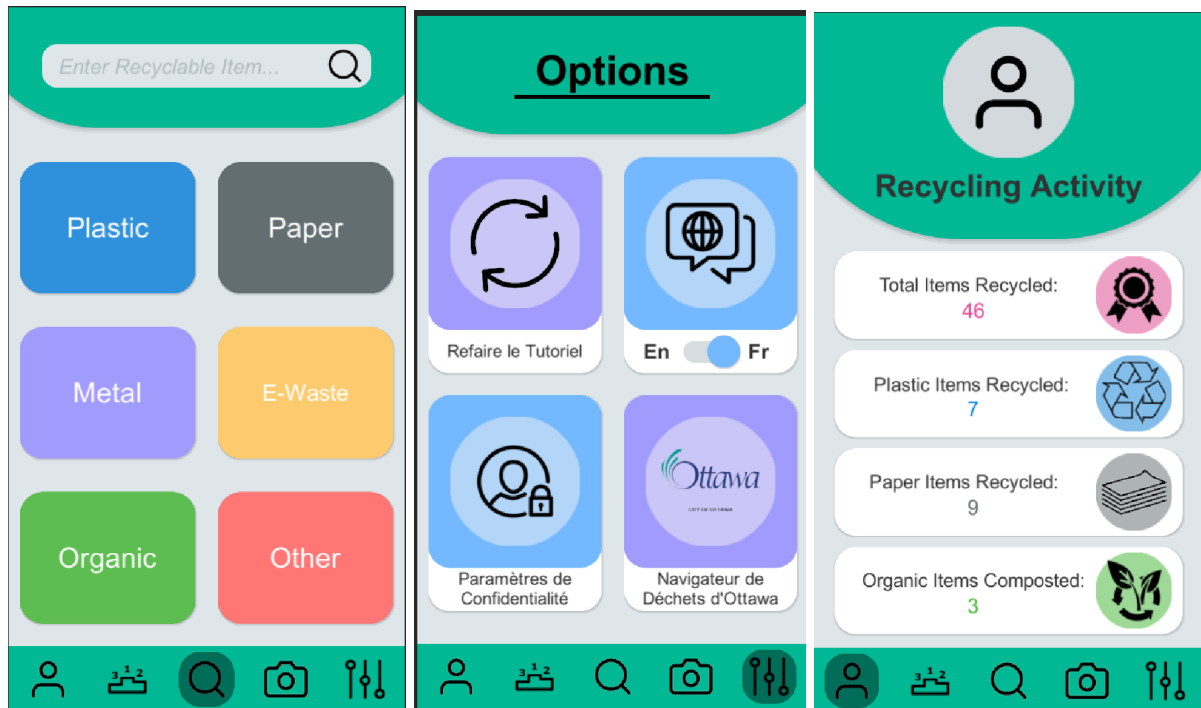


Figure 4: Manual Search, Options and User Scenes

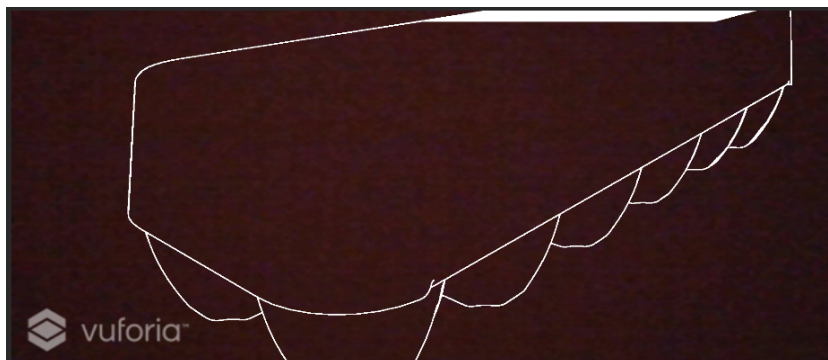
## Scanner

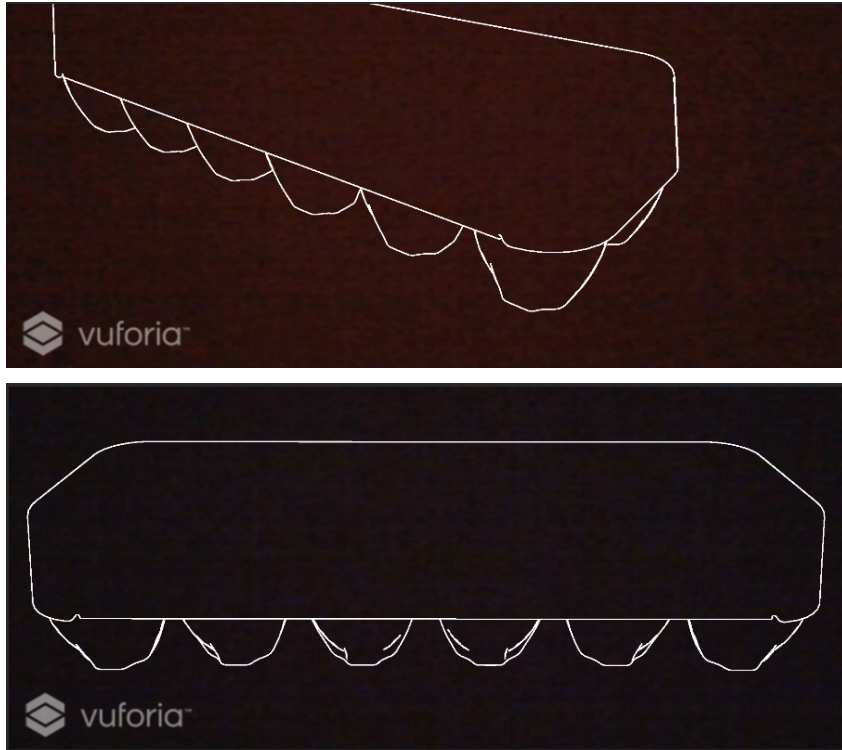
Tahmeed has created model targets of an egg carton and a tin can with multiple guide views, which are ways the object could be scanned based on its features. However, Vuforia does not support running multiple view guides simultaneously during runtime. If the user does not know what viewguide their image target has to align with, then scanning their item will be impossible.

Vuforia has advertised a feature called advanced model target databases, which should be able track 360° around an object. Firstly, a model target must be generated by Vuforia's Model Target Generator and must be trained to obtain an advanced model target. This would be by far the most ideal solution to implementing model targets. However, multiple attempts were made at making a functioning advanced database and none of the advanced targets were able to pick up the carton and the banana peel. The lack of augmentability may be due to the nature of the models used, as they may have low amounts of detail and/or rotational symmetry.

Thus, our group stuck to using normal model targets with various viewguides. This solution comes with a caveat, as we would have to let the user know what viewguide the scanner is trying to pick up and we cannot have multiple view guides show up simultaneously. Tahmeed originally suggested we add a button that the user clicks that informs the app they are picking up an irregularly shaped object. And from a menu of irregularly shaped objects, the user can pick and choose what item they want to scan. The main caveat to this is that the user must know what item they're scanning, but not necessarily which bin it should go to. Noah said if a user knew what an item was but didn't know where it went, they'd just use the manual search. Thus, it might be safer to simply use multiple model targets with different scanning views and anticipate the angle the user will attempt to scan their item with.

These are the different types of view guides used for the egg carton:





*Figure 5: Egg Carton View Guides*

Based on user feedback, the bottom most was the easiest view guide to scan from, since it is relatively easy to line up the carton with the view guide. There is some difficulty with implementing lining up the items properly with the guideview, as the 2D guide view does not provide much of an idea of the angle required to properly augment the object.

This is the view guide for the tin can:



*Figure 6: Tin Can View Guide*

This was slightly harder for the users to scan because the tin can has to be in a very specific orientation before it's picked up by the scanner.



What could be improved on before design day is allowing the user to view and switch between individual guide views during runtime, though this requires learning some scripting knowledge. The best possible solution would be to get working advanced model targets suitable for generic materials, but these require more detailed 3D models, which cost money and time to purchase or create ourselves.

## **Leaderboard**

Some issues that have to do with the development of the leaderboard have occurred, which are delaying its creation. A meeting with the TA has been scheduled to find a solution to the problem that has arisen. If the problem is resolved soon, we will attempt to implement the leaderboard. Since design day is coming up, if the problem is not resolved in the near future and there is not enough time to implement it, the team will discuss and will not include the leaderboard in the application. However, the idea of the leaderboard will not be excluded for further development.

## **Prototype 3 Progress and Test Results**

<b>#</b>	<b>Specification</b>	<b>Target Value</b>	<b>Test Result</b>
<b>Functional Requirements</b>			
<b>1</b>	Compatible with common operating systems (IOS & Android)	Yes	Android Yes IOS not tested
<b>2</b>	Uses camera features to facilitate recycling	Yes	Scanner uses Vuforia AR plugin to identify objects with phone camera
<b>3</b>	Ability to accurately identify waste items	Yes	Search and Scan features currently only identify a limited selection of items
<b>4</b>	Outputs recycling method for a waste item	Yes	Database Pages state which bin to place an item in
<b>5</b>	Provides information about locations for disposal of irregular recyclable items	Yes	Database Pages provide a link to the city database which has information on e-waste depots and retailers that accept recyclable items
<b>6</b>	Identifies which bin to use for different recycling methods	Yes	Database Pages state which bin to place an item in
<b>7</b>	Adjusts recycling method for contaminants	Yes	Database Pages give

			additional information about contaminants
<b>Constraints</b>			
1	Budget	<\$100	\$25 Google Play Games
2	Storage	<1000 MB	133 MB (Android)
3	Device Requirements	IOS 12.0+ Android 5.0+	Android 7.0+ IOS 11.0+
4	Display Size	Any Screen Size	App fits most portrait views on common iOS and Android Devices. List of portrait aspect ratios include: iPhone X/XS (1125x2436) iPhone XR (828x1792) iPhone XS Max (1242x2688) iPhone 5/5S/SE (640x1136) 720x1280 1080x1280
<b>Non-Functional Requirements</b>			
1	User-friendly navigation and interface	Yes	User interface is mostly complete but could use improvements
2	Clear and concise tutorial	Yes	No tutorial exists yet
3	Multi-language	English & French	Toggle button to switch language is functioning  Only a portion of all text elements currently have translations
4	Usable in different places (not limited to municipality/city/town)	Yes	Only Ottawa currently
5	Tracks how much user is recycling	Yes	Tracks the total number of items as well as the total number of plastic, paper and organic items

# Feedback

## **Eleftheria:**

“I like it because the design is nice and simple. I like the fact that it has brief and simple information about the item.”

“What will happen if I click ‘yes’ but lied and did not recycle the item?”

## **Konstantina:**

“Metal, Electronics, and Other should also be included in the useface page. I like the icons (in the user interface page) because it makes a nice visual and it is colour coded.”

## **George:**

“I like that it is user friendly and simple to use.”

## **Tahmeed’s Mom**

“UI looks nice, I hope you make scanning a bit easier though. It took a while for me to figure out the right angle to scan it from.”

## **Conclusion**

In this deliverable, the subsequent model was created by following the model arrangement that was recently made in Deliverable G just as improving and adding more highlights to those carried out to model one. For this deliverable, tests were performed for the principle functionalities of the second model to meet the customer’s criticism. The model was created to be superior to the first and to give us a reasonable picture regarding what the end result will be. The criticism that was gotten for every functionality will be mulled over to execute the future models.

## **References:**

unity. “Best Practices for Designing and Developing Image-Based Targets.” *Best Practices for Designing and Developing Image-Based Targets* | *VuforiaLibrary*, [library.vuforia.com/features/images/image-targets/best-practices-for-designing-and-developing-image-based-targets.html](http://library.vuforia.com/features/images/image-targets/best-practices-for-designing-and-developing-image-based-targets.html).