Project Deliverable E:
Project Schedule & Cost

GNG 1103 - Winter 2021
Faculty of Engineering - University of Ottawa

uOttawa

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Teaching Assistant: Ebin Joseph & Jasen Lee
Client: Mitch Bouchard

Due Date: February 28th, 2021

Team Name: GreenAR World

Group #6 Members:
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Table of Contents

1.0 Introduction

The objective of this deliverable is to develop a specific project schedule and a cost estimation to complete all three prototypes by the end of the semester. Currently, our team has created concepts for five different subsystems for our "GreenAR World" application. The five subsystems are the introduction screen, main screen, internal settings menu, information menu, and the rewards screen. In this deliverable, we will come to an agreement for our final design that we will implement in the following prototypes. In order to ensure that we stay on task and are up to date, we will use Wrike to assign various tasks to each team member, set deadlines for tasks, and monitor goal progression. This will allow us to be successful in all three prototypes.

2.0 Detailed Illustration of Final Design

2.1 Introduction Screen

Introduction Screen Features:
- The introduction screen will include a large clear "Start" button that will be used to advance to the main screen
- The GreenAR World logo, and the slogan "Recycling made simple"
- Background of the introduction screen will utilize earthy colours to flow with the recycling aesthetic. A simple green and blue gradient

2.2 Main Screen:

Main Screen Features
- The main screen will be primarily the view of the camera
- Large "Analyze" button that is easy for users to find, the function of this button is clear to users
- Analyze button will be used to scan objects and display disposal information
- To the right of the "Analyze" button, a flash toggle will be found to ensure usability in both day and night conditions
- To the left of the "Analyze" button, a search icon will be present, for the rare occurrence where the identification malfunctions. The user will then be able to manually input the type of waste they wish to dispose of and receive proper instructions
- The top border of the screen will always have the menu pages/options so navigation is easily done. Nothing is hidden so users can easily find what they are looking for
- Once item scanned, application will redirect to a page specifying the item and giving you recycle instructions
- Will display a wash container warning if the item scanned is recognized as a food container
- The save button is for users who choose to save their recycling history as well as track their recycle points/rewards

2.3 Internal Settings Menu
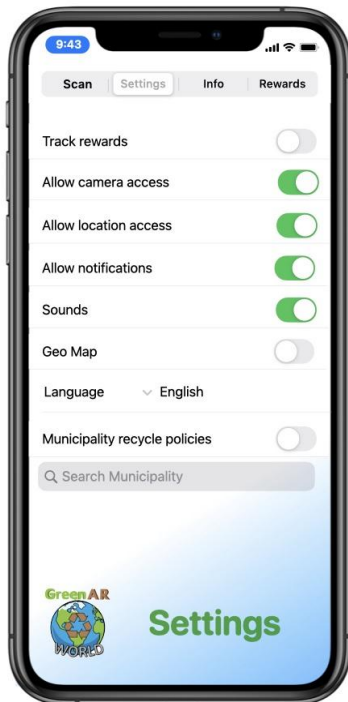
Internal Settings Features
- The internal settings screen will have options for the user to enable and disable privacy features, as well as simple settings to better the user's experience.
- For privacy, the user will be given the option if they would like the app to use their location, as well as if they give permission for the app to record/track their previous "scans"
- Users will also have the option to enable or disable notifications sent by the application.
- Finally, users will have the option to turn off or on the rewards system implemented in the application.

2.4 Information Menu:
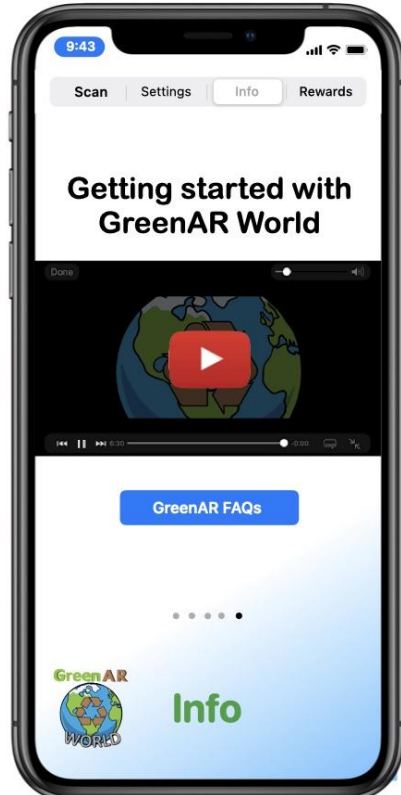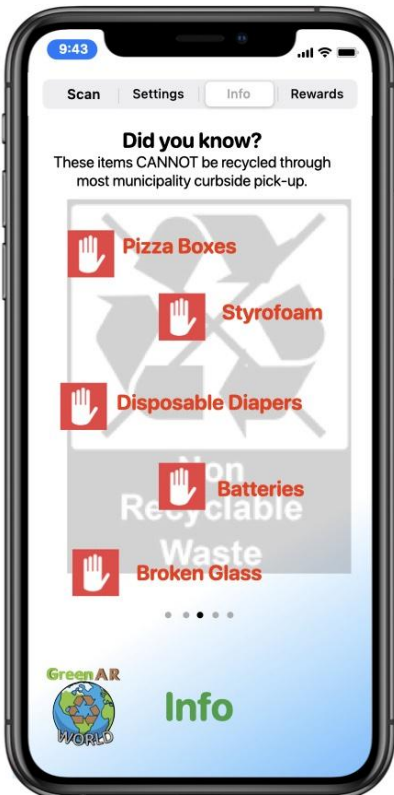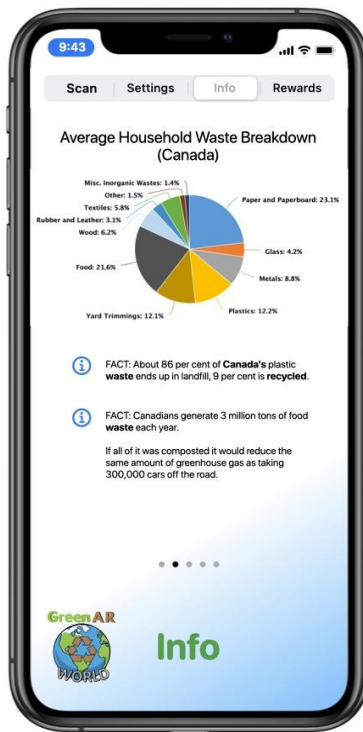
Information Menu Features
- Contain statistics for recycling habits within the average Canadian household. This can be more detailed to an individual city or can be expanded to compare statistics with other countries
- Entertaining facts surrounding recycling to keep the user engaged. This is an effort to educate application users on the importance of recycling
- Waste disposal schedule associated with your location/city. Application to give the user a friendly reminder of when/what garbage day is coming up
- Clear warning type screen indicating what items absolutely cannot be recycled for most curbside garbage pick up
    - Give clear instructions on how this can be done (ex give information on how electronics or batteries are properly recycled)
- A short tutorial video will also be provided in this section for new users who are confused or are trying to maximize the use of this app.
    - A frequently asked questions (FAQ's) section will also be provided to answer common questions that users may have
    - Make the tutorial and instructions easy to understand and follow for any level of tech user

2.5 Rewards Menu:
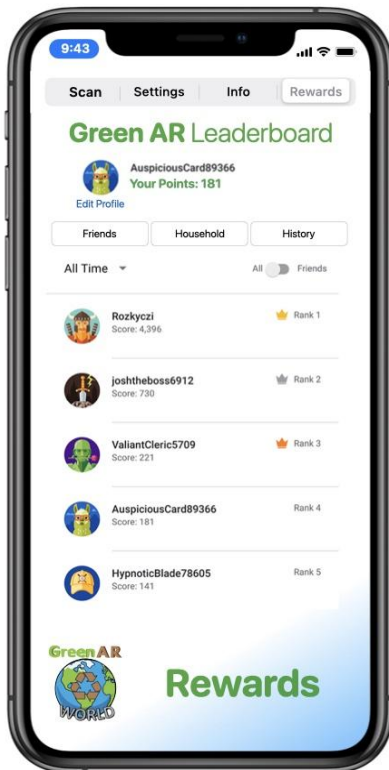
Rewards Screen Features
- The rewards screen will be divided into 5 sections; profile, friends, household, history, and leaderboard.
- The profile section will display your account name alongside the total amount of points you have earned.
- The friends section is where all your friends that you have added within the app will be displayed, as well as their total amount of points. The household section is the same but displays members in the same household as you.
- The history section is where the user will be able to find all of their previous "scans" and what type of recycling method was required for each.
- The leaderboard section will display either a global, or municipal leaderboard where you can track how many points you have accumulated compared to others.

3.0 Schedule for Prototyping and Testing

## 3.1 Prototype I (February 26-March 7)

Goal: To figure out the fundamentals of image recognition, license keys and integrate object recognition.
1. Research how to use softwares needed to create our application (February 10-February 26)
   - All members
   - Learn and play with the software to get comfortable with it
   - Unity, Vuforia, etc.
2. Add all Image Targets within license key (February 28-March 1)
   - Personnel responsible: Ethan Leung
3. Implement Vuforia license key within the Unity Workspace (March 1)
   - Personnel responsible: Ethan Leung
4. Create image recognizing features in Unity (March 2-March 3)
   - Personnel responsible: Alexander Fournier / Keera Moretti
5. Create the introduction screen (March 1-March 4)
   - Personnel responsible:Monica Harada / Branden Leung
6. Finish prototype I (March 5)
   - Implement finishing touches
   - Personnel responsible: each team member
7. Team verification of prototype I (March 6)
   - Each member of the team will provide constructive feedback regarding this prototype. Everyone will explain what they like and dislike about the application.
8. Submit and present prototype I (March 7)
   - Personnel responsible: Monica Harada

3.1.1 Prototype I Project Risks & Contingency Plan

During the first prototype, there could be various risks and conflicts that could occur. Although we have practiced using the Unity software during our lab sessions, there are many features that have been

undiscovered. When we implement our first prototype, there will still be a learning curve. We are still trying to become comfortable with Unity. As discussed above, we will be learning and using the image recognition feature with Unity and developing the introduction screen. The risks that are associated with this prototype is having the introduction boot up screen to be smooth and efficient. Also, a challenge that we will face is moving from the introduction screen directly to the main screen. Since this project is to be completed virtually, we will have difficulties collaborating to create the application. In order to resolve this situation, we will be having one or two team members to complete a certain task within the prototype. If a team member is having trouble completing their assigned tasks, other team members will contribute and help resolve the issue by providing suggestions and support.
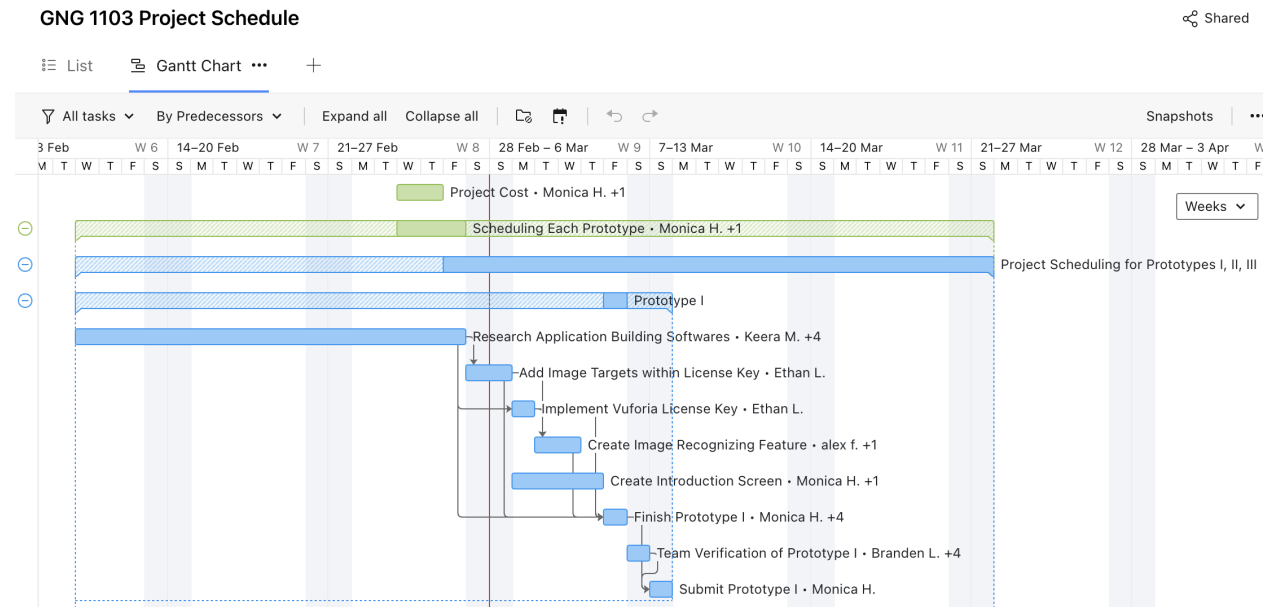
3.2 Prototype II (March 7-March 14)

Goal: Work towards building the main screen and basic navigation of the application to make sure design will work.

1. Implement the Analyze button that reveals information surrounding the identified image target. (March 7)
   - Personnel responsible: Branden Leung
2. Implement menu overlay on the main screen. (March 7-March 8)
   - Personnel responsible: Ethan Leung
3. Work towards application being able to correctly identify and categorize garbage. (March 7-March 11)
   - Personnel responsible: Ethan Leung / Alexander Fournier
4. Create and complete the information menu. (March 8-11)
   - Personnel responsible: Keera Moretti / Monica Harada
5. Finish prototype II (March 12)
   - Implement finishing touches
   - Personnel responsible: each team member
6. Team verification of prototype II (March 13)

- Each member of the team will provide constructive feedback regarding this prototype. Everyone will explain what they like and dislike about the application.
7. Submit and present prototype II (March 14)
   - Personnel responsible: Monica Harada

3.2.1 Prototype II Project Risks & Contingency Plan

Prototype II is essential in our application since it aims to incorporate basic navigation. This prototype is essential to making the application as user friendly as possible. The risks associated with this prototype is not being able to implement navigation from screen to screen. It is definitely possible for us to create each screen independently but linking those together may be a difficult task. For the information menu, there are so many resources on the internet and we need to filter, choose and site each source properly. This may be a challenge for us as well. The biggest risk that this prototype faces is the fact that all group members will not be able to work together in person. When it comes to creating/coding an application, it is difficult to share the same file, make modifications and send it to other members of the group. If our assigned tasks and steps to achieve this prototype do not succeed, our contingency plan is to assign one member of our group to work on making the overall application. Other members of the group will give their ideas, inputs and mostly support the one person in charge of completing the application.
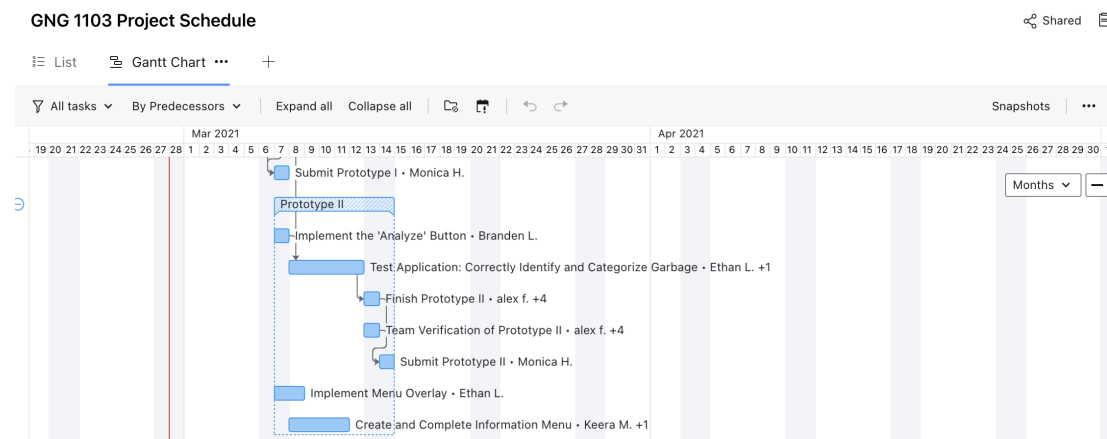
3.3 Prototype III (March 14-March 21)

Goal: Create a fully functioning application where all subsystems are implemented and application works to a degree of 95% accuracy.
1. Implement a proper start-up screen (March 14-15)
   - Personnel responsible: Alexander Fournier / Ethan Leung
2. Implement rewards menu including all subcategories, ie ranking, recycling history, friends etc (March 14-March 17)
   - Personnel responsible: Monica Harada / Keera Moretti / Ethan Leung
3. Test the application with various recycling products and modify anything if necessary (March 18)
   - Personnel responsible: Branden Leung / Alexander Fournier
4. Team verification of prototype III (March 19)

- ○ Each member of the team will provide constructive feedback regarding this prototype. Everyone will explain what they like and dislike about the application
5. Fully functioning product completed (March 20)
   - ○ Implement finishing touches
   - ○ Personnel responsible: each team member
6. Submit and present prototype III (March 21)
   - ○ Personnel responsible: Monica Harada

3.3.1 Prototype III Project Risks & Contingency Plan

The risks associated with prototype III is not being able to finish a fully functioning application by the end of the semester due to the limited timeframe. We have associated timelines with each task we must complete. However, these timeframes may be inaccurate and are subject to change until we actually start building our application. We may also face problems in the testing stage since the recycled items may not have a 95% accuracy detection. Since we are not using a reverse image search, machine learning or AI, we must input every recycling material we want to scan manually. This is a time consuming process and would limit the application's potential. Our contingency plan for this prototype is to use google reverse image search although we were advised not to do so. We feel that having a practical, working prototype that has our 95% accuracy goal is far more superior than having a prototype that does not have a wide range.
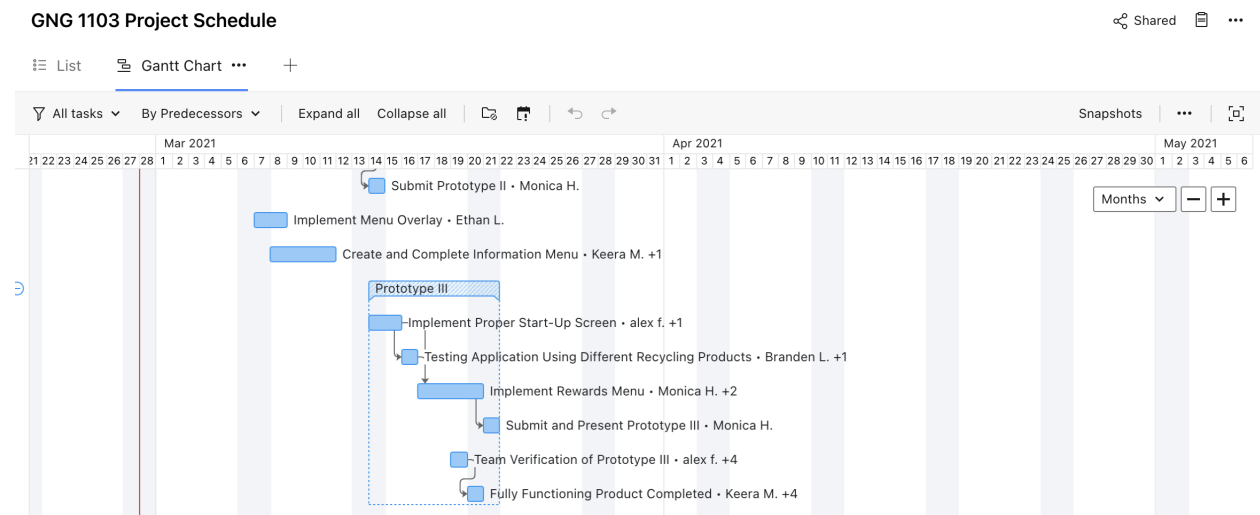
4.0 Project Cost

Table 1: Bill of Materials for GreenAR World Mobile Application

Bill of Materials				
Item	**Item Description**	**Quantity**	**Unit Price**	**Amount**
Unity	Augmented Reality Software	1	$0	$0
Vuforia Package	Model target generator, scanner support, and area target software that will be used in Unity	1	$0	$0
Recyclable items	Any item that has the recyclable symbol so that it can be tested using our application. Examples include but not limited to: ● Plastic Water Bottle ● Plastic Bowl ● Glass Bottles ● Paper Bag ● Newspaper ● Soda Can ● Milk Carton ● Plastic Utensils	1-10	$0	$0
Garbage/Compost	Any item that is compostable	1-10	$0	$0
			Total	$0

Since the GNG 1103 Course is being taught online, we are creating a mobile application and not a physical product. All of the softwares and materials we are using for this project are offered for free. The softwares we plan to use is either free to users or we get special access/trial periods because we are university students.

As a result, we will not be spending our $100 budget at this moment in time. When it comes to building our application, this statement is subject to change. We may run into issues with the softwares that we are utilizing for developing this application and we may have to purchase another software or other equipment. The recycling products we have specified in the project costs above are free for obvious reasons. The recycling products will be used to test and demonstrate our application.

5.0 Conclusion

To sum up everything previously stated, our team has collaborated together to create a comprehensive recycling app that will address the needs outlined by our client. Implementation will now be the major challenge our team must overcome. The ambitious design will likely take several prototypes before we can bring all aspects to life and in working order. The low-cost nature of producing an app reduces any financial barriers which could impede its implementation, therefore with proper scheduling and time management our team should be able to bring this design to fruition by the assigned deadline. We will utilize the scheduling platform 'Wrike' to ensure all team members stay on track and to keep the allocated tasks organized. To ensure the success of producing this app, it is of the utmost importance that all team members familiarize themselves with the 'Unity' platform capabilities, as this is the platform in which the app will be programmed.

6.0 Appendix: Wrike
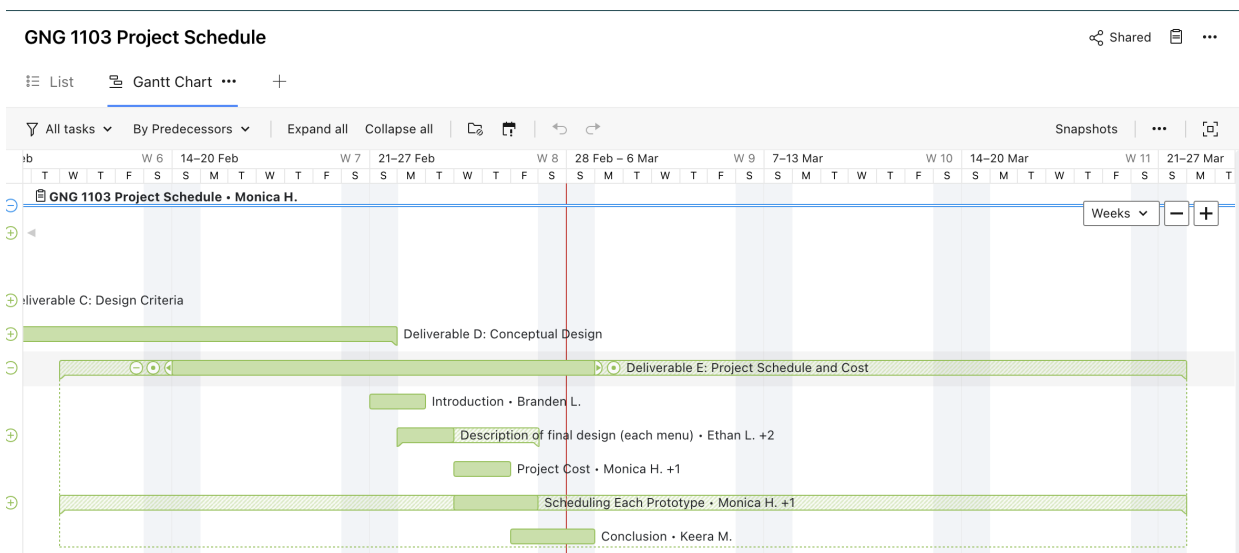
Project Schedule for Deliverable E (Gantt Chart View)

⌄ 👥 Deliverable E: Project Schedule and Cost	28 Feb	Completed
BL Introduction	22 Feb	Completed
⌄ Description of final design (each menu)	23 Feb	Completed
KM Detailed illustration of final design	26 Feb	New
Project Cost	25 Feb	Completed
⌄ Scheduling Each Prototype	26 Feb	Completed
⌄ 👥 Project Scheduling for Prototypes I, II, III	21 Mar	New
⌄ 👥 Prototype I	5 Mar	New
Research Application Building Softwares	26 Feb	New
EL Add Image Targets within License Key	28 Feb	New
EL Implement Vuforia License Key	1 Mar	New
AM Create Image Recognizing Feature	3 Mar	New
Create Introduction Screen	4 Mar	New
Finish Prototype I	5 Mar	New
Team Verification of Prototype I	6 Mar	New
MH Submit Prototype I	7 Mar	New

List View of Deliverable E (List View) - Part 1

⌄ Prototype II		New
BL Implement the 'Analyze' Button	7 Mar	New
EL Implement Menu Overlay	8 Mar	New
KH Create and Complete Information Menu	11 Mar	New
EF Test Application: Correctly Identify and Categorize Garbage	12 Mar	New
Finish Prototype II	13 Mar	New
Team Verification of Prototype II	13 Mar	New
MH Submit Prototype II	14 Mar	New
⌄ Prototype III		New
AL Implement Proper Start-Up Screen	15 Mar	New
BF Testing Application Using Different Recycling Products	16 Mar	New
Team Verification of Prototype III	19 Mar	New
Fully Functioning Product Completed	20 Mar	New
M Implement Rewards Menu	20 Mar	New
MH Submit and Present Prototype III	21 Mar	New
KM Conclusion	28 Feb	Completed

List View of Deliverable E (List View) - Part 2