

## **Deliverable E – Project Schedule and Cost**



### Group 5

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## 1.0 Introduction

Large scale projects can have many components and milestones, which can lead to complex sequences and confusing elements. Without proper management tools, projects can fall into chaos and be a failure. Some of the most important tools to organize projects and improve its chances of succeeding are scheduling, cost projections and a risk assessment. The goal of this project is to create a system that will help individual users at home quickly and easily sort their items into the correct recycling bins. After an extensive evaluation and analysis process, the chosen solution was an AR app that will scan the item, compare it to an existing database of images and then indicate to the user where the item should be deposited. Now that this phase has been completed, the following steps are to develop a comprehensive prototyping and testing schedule, to identify projected project costs and to asses possible risks to the success of the project, with potential mitigation measures to counteract these risks.

## 2.0 Detailed Description of the AR App

The opening page of the app (Figure 1) goes directly to the scanning screen. The scanning screen contains guides to help the user position the item correctly so that the app can scan it more efficiently and quickly. At the bottom of the page, a home, account and settings button can be located. These buttons lead to different pages. The settings page contains a tutorial as well as a complete guide to explain everything in greater detail. If an issue occurs the user can send a message and refer to a questionnaire that helps determine the item's fate. The account page allows the user to create an account in order to collect points. An explanation of how the rewards work can be found on the rewards page, along with the user's streak and number of points.

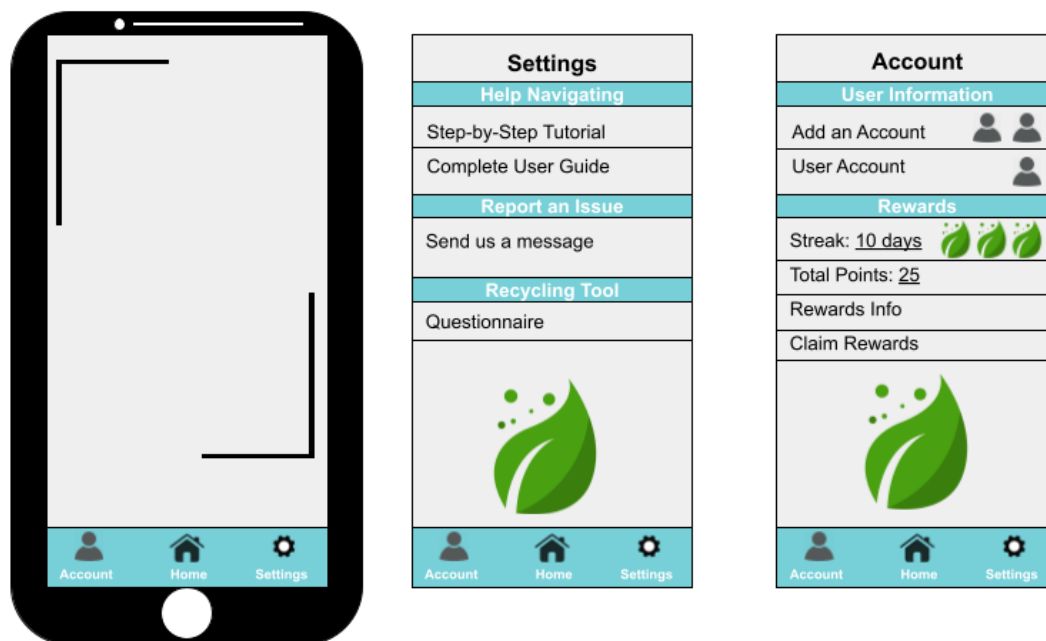


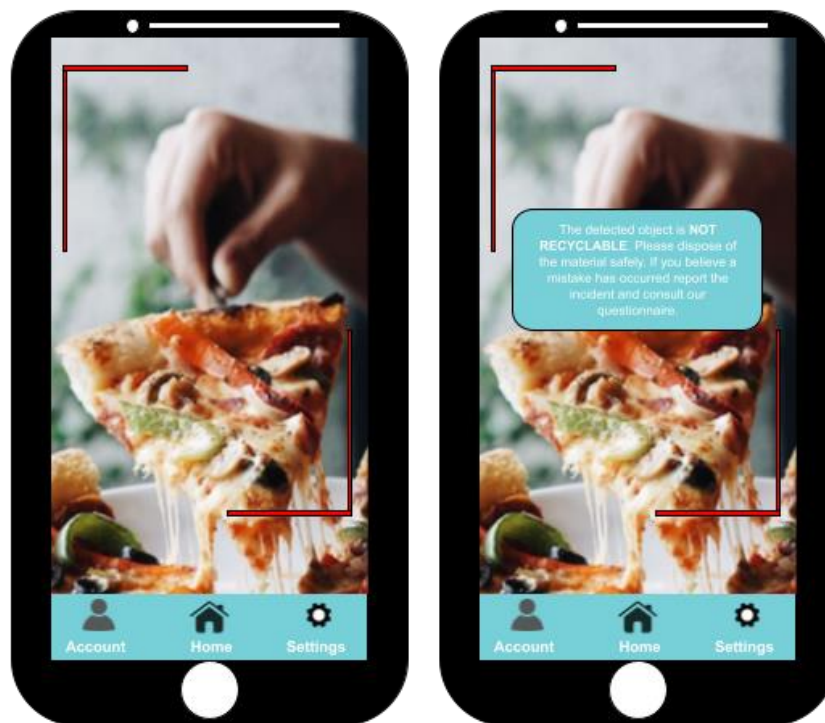
Figure 1 - Opening page of the app.

Figure 2 below shows a mock-up of a possible app icon. The colours were selected based on colour theory. The design and colours reflect the environment and reason behind the creation of the app.



*Figure 2 - Possible app icon.*

When an object is not recyclable (such as pizza), the scanning guides will change colour from black to red (Figure 3). After this a message will appear detailing whether or not the item is recyclable (to confirm this to the user). In this case the message will confirm that the item is not recyclable. The message will also detail where the item should be placed (if it is recyclable) and suggests what actions to take if the user is certain a mistake has occurred.



*Figure 3 - Example of a non-recyclable item being scanned.*

When an object is recyclable (such as a plastic water bottle), the scanning guides will change colour from black to green (Figure 4). After this a message will appear detailing whether or not the item is recyclable (to confirm this to the user). In this case the message will confirm that the item is recyclable. The message will also detail where the item should be placed (if it is recyclable) and suggests what actions to take if the user is certain a mistake has occurred.



*Figure 4 - Example of a recyclable item being scanned.*

### 3.0 Projected Project Costs

The cost of building and maintaining an application can be a heavy price for a starter company. Applications can cost anywhere from \$10,000 to \$100,000 and even more if they are complex. However, for this tool the coding and development is going to be done in-house. Meaning the application will be mostly free to produce barring the licencing needed to add it to the play stores of IOS and google. Apple also offers to waive the yearly fee if the application is too be used as tool for non-profit, educational institution, or the government. Also, all the tools needed to create the app are provided by the University. As for the material used to test the efficiency of the application, household recyclable items will be used. The total cost per year comes up to \$157.99. However, if the apple developer fee is waived then the cost will amount to \$31.85\$/year.

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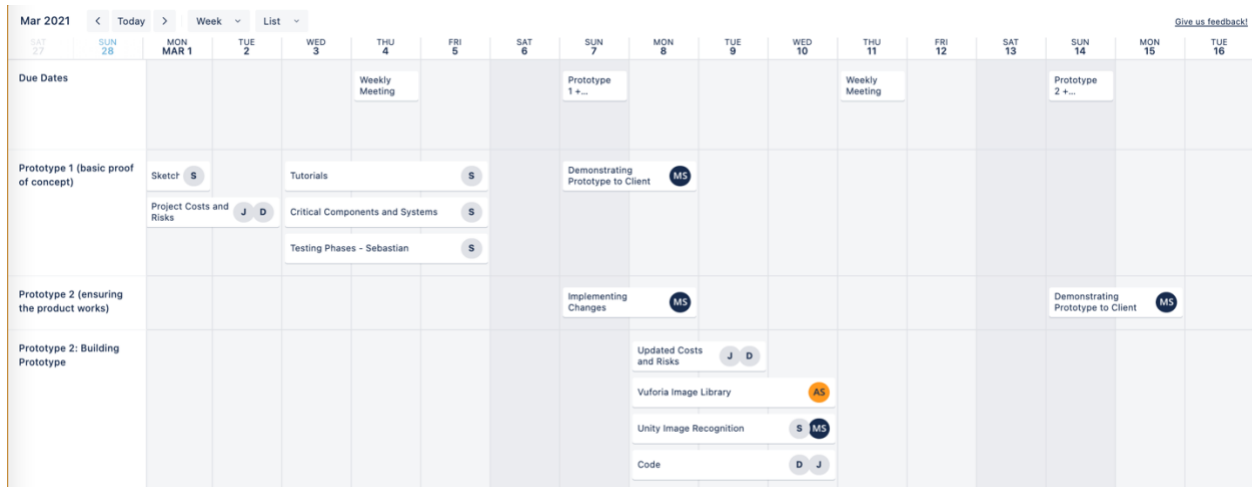
*Table 1 - Summary of project costs and materials.*

Material/Tool	Cost
Apple Developer License	\$99USD -> \$126.14CAD/year**
Android Developer License	\$25USD -> \$31.85CAD/year
Programmer/ developer	Free
Unity	Free
AR Tool	Free
Recycling material for testing	Free
<b>Total</b>	<b>\$157.99\$/year</b>

*\*The apple developer fee may be waived if the app is used for non-profit, educational institution, or the government.*

## 4.0 Prototyping and Testing Schedule

Please see in the figures below the schedule for the 3 prototyping and testing phase. The schedule can also be accessed with the following [link](#).



*Figure 5 - Schedule of prototype I & II.*

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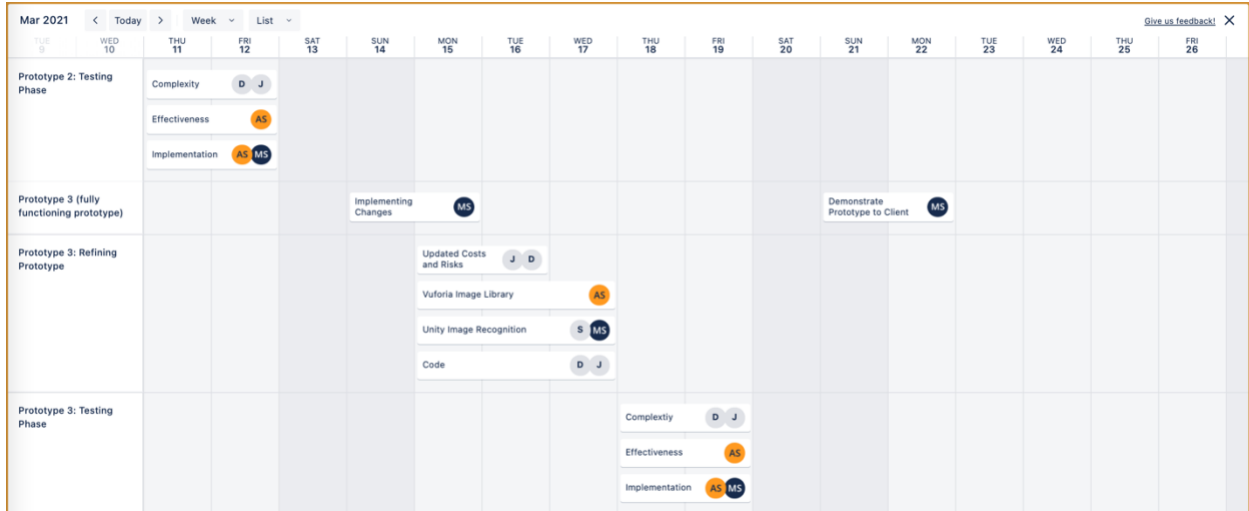


Figure 6 - Schedule of prototype II testing, development of prototype III and testing of prototype III.

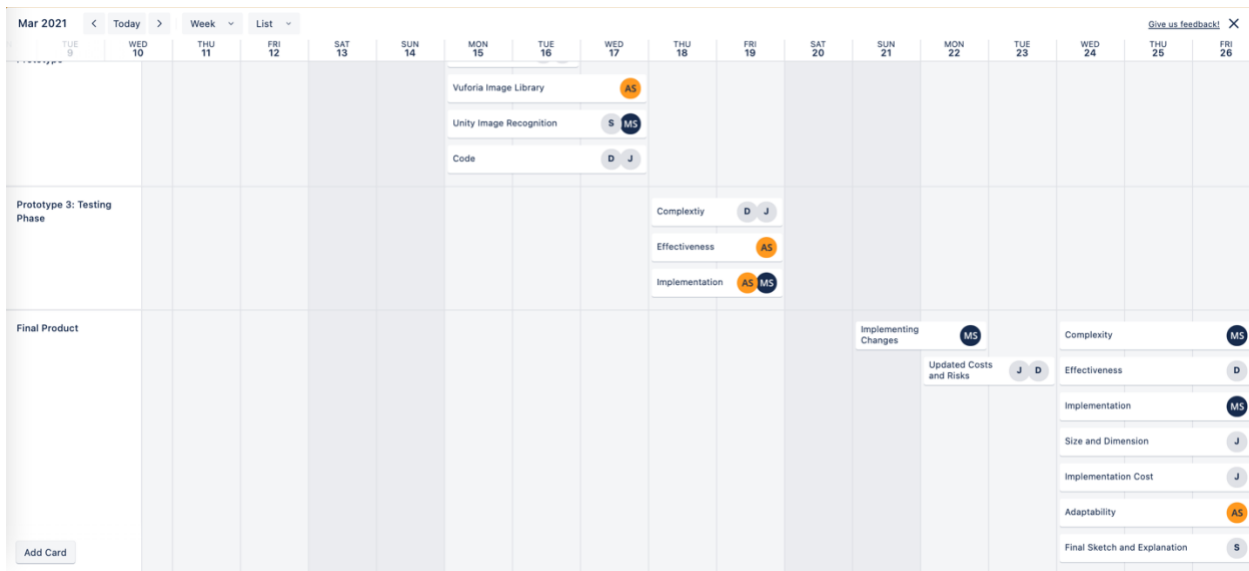


Figure 7 - Schedule of final product and testing.

## 5.0 Projects Risks, Mitigation Measures and Contingency Plan

The most obvious risk related to the functionality of the application is the scanner itself. To tackle the first major issue with the scanner: the database. What must first be addressed is how much variation is possible in recyclable materials. In general, these materials can be sorted into two different categories: cardboard/paper and glass/plastic. The most realistic solution would be to scan and upload as many of the most commonly recycled materials that come to mind to the database, which the code will then draw upon. The risk associated with this strategy lies in the teams inability to create a database that fully catalogues every item that can be recycled.

The next risk is with the coding. The program itself will be relatively simple, as it will simply receive data from the scanner, compare it to data in the file it accesses, and then give an output based on what it reads it as. The only possible negative outcome from the code is that it



does not work as intended. The risk posed by this is not as extreme as others, as if the code is created efficiently, debugging and troubleshooting are effective solutions.

In addition, there is the factor to consider of potential cost fluctuation. As it currently stands, the *Unity* engine, and *Vuforia*, is free to use which currently fits within the price bracket set for this project. However, if any of these prices were to increase, so as to not break the rules, the plan would have to change. Since *Unity* is integral to the creation of the product, it is a non-negotiable cost. If the price to list an app were to increase, we would need to circumvent the issue by running it on some other platform, like a website.

For *Vuforia*, the risk is it could potentially pose to the budget is greater than any other software. If the product reaches a high level of image recognitions per month, the client will be forced to pay ~\$500/year for licensing and distribution, which far exceeds the price limit. Furthermore, if this threshold for image recognition is decreases, or is removed entirely, the same costing issue would arise and some other image tracking database will have to be used.

Combined together, all of these risks compound into a single issue, being that if any were to occur, the timeline of the project work would be thrown askew. If the database is not comprehensive enough, time will need to be taken to supplement it. If the code does not work, fixing it takes time. If any of the software being used to construct the project begins to cost money to use, all the work will need to be migrated to a new medium, which could potentially erase progress.

## 7.0 Conclusion

In conclusion, every large project needs proper scheduling, budgeting and risk assessment to ensure the highest odds of success. With the chosen solution of an AR app that will scan items and sort them by comparing them to an image database, the team is confident the client's needs will be met. By creating a prototyping and testing schedule, establishing projected project costs and assessing potential risks, the success of the project is much more likely.

## References

- [1] Apple. 2021. “Apple Developer Program.” <https://developer.apple.com/support/compare-memberships>. Accessed Feb 26, 2021.
- [2] Sched. 2021 “Apple and Google Developer Accounts.” <https://sched.com/support/guide/apple-and-google-developer-accounts>. Accessed Feb 26, 2021.
- [3] Blair, Ian. 2018. “App Development Costs: \$1,000 App vs. \$10,000 App vs \$100,000 App (What’s The Difference?)” *buildifre*. <https://buildfire.com/app-development-costs-difference/#:~:text=If%20you're%20going%20to%20develop%20a%20native%20app%2C%20you,separate%20native%20apps%20for%20this>. Accessed Feb 26, 2021.

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## Appendix A – Updated Project Plan

