

## Section VII: Appendices

### Appendix 1: Gamification Strategy Survey Questions

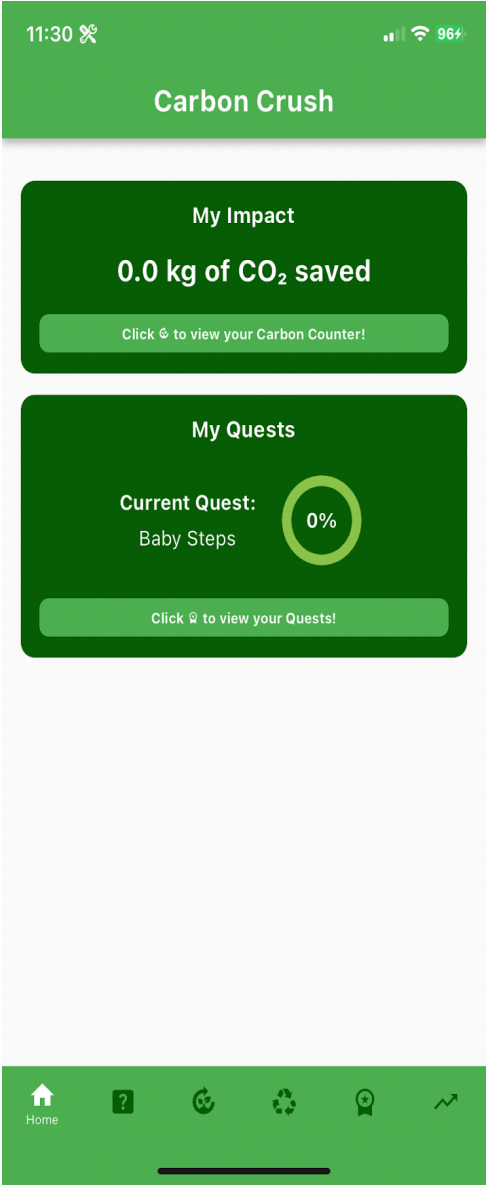
The following questions were used in the Gamification Strategy Survey. Over 98 individuals across the United States responded to the survey.

What is your age?
How frequently do you recycle? Assume that waste refers to recyclable materials.
Does your household recycle?
How much do you know about proper recycling habits? 1 signifies that you do not know how to recycle. 4 signifies that you are proficient in recycling habits such as sorting and cleaning recyclables.
How motivated are you to recycle?
Rank how strongly you agree that each feature would increase your motivation to recycle more and improve recycling habits such as cleaning and sorting recyclables. <ul style="list-style-type: none"><li>- Eco Points: Points awarded each time the user logs recycling. Additional points are awarded for washing food contaminated recyclables and for sorting new materials.</li><li>- Leader Board: Allows the user to compete individually against their friends and neighbors to see who can earn the most Eco Points.</li><li>- Teams: Gives users the ability to form teams with their friends and/or neighbors to compete in long term challenges with other teams.</li><li>- Streak: Counters that track the number of days in a row that a user meets their recycling goals.</li><li>- Carbon Counter: Helps users to see their individual effect on the environment by relating the amount of carbon they've prevented from entering the atmosphere to relatable measurements.</li><li>- Badges: Users earn badges by completing challenges, finishing at the top of a leaderboard, hitting a streak milestone, or completing a defined task. Other users can see which badges you have unlocked and how rare the badges are.</li><li>- Analytics: A weekly report that gives the user an overview of how they performed during the week. It shows if their habits are becoming more positive or negative and highlights their achievements.</li><li>- Personal Goal Setting: Allows users to set goals for how they want to improve their recycling habits over the course of a week. If goals are met, they will be rewarded with Eco Points.</li><li>- Eco Tips: Quick tips on how to improve your recycling habits or about recycling's profound impact on the environment shown when opening the app and when logging activities.</li><li>- Monetary Incentive: A voucher to an eco friendly company, such as Too Good To Go, that is earned by completing defined challenges.</li><li>-</li></ul>

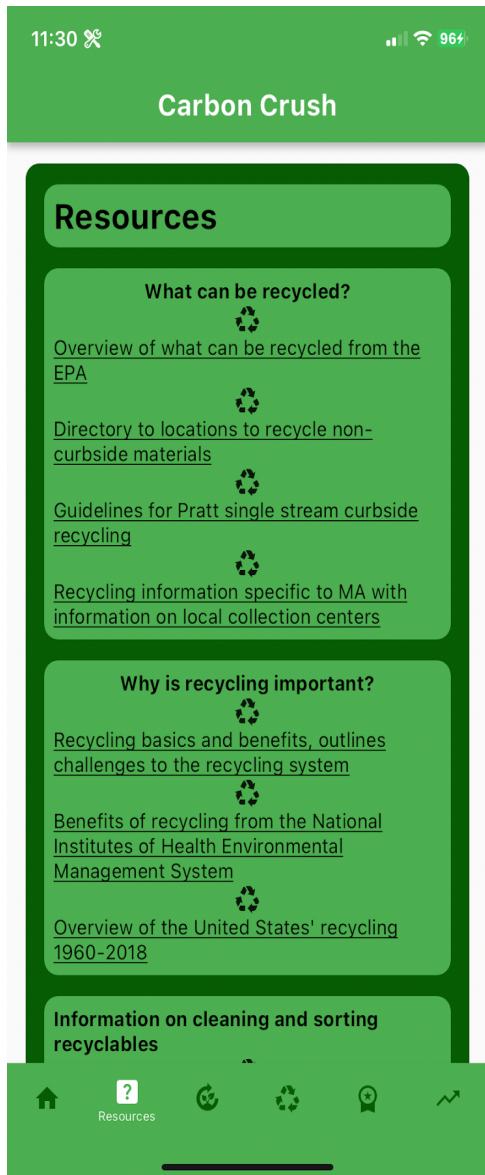
### Appendix 2: Carbon Crush Screenshots

The following screenshots depict the app that was deployed to Local, Remote, and Non-Recycling Senior Citizen participants.

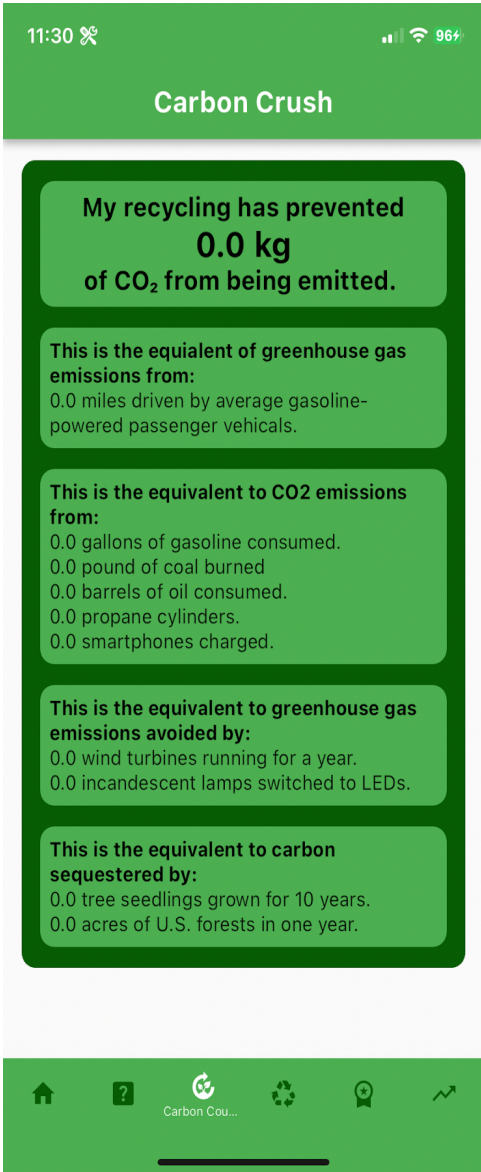
*Home*



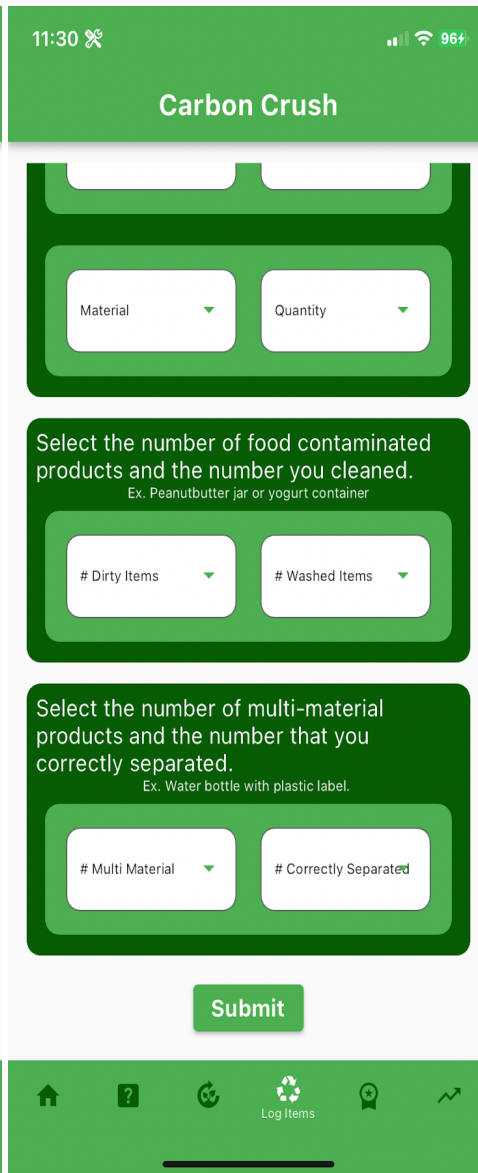
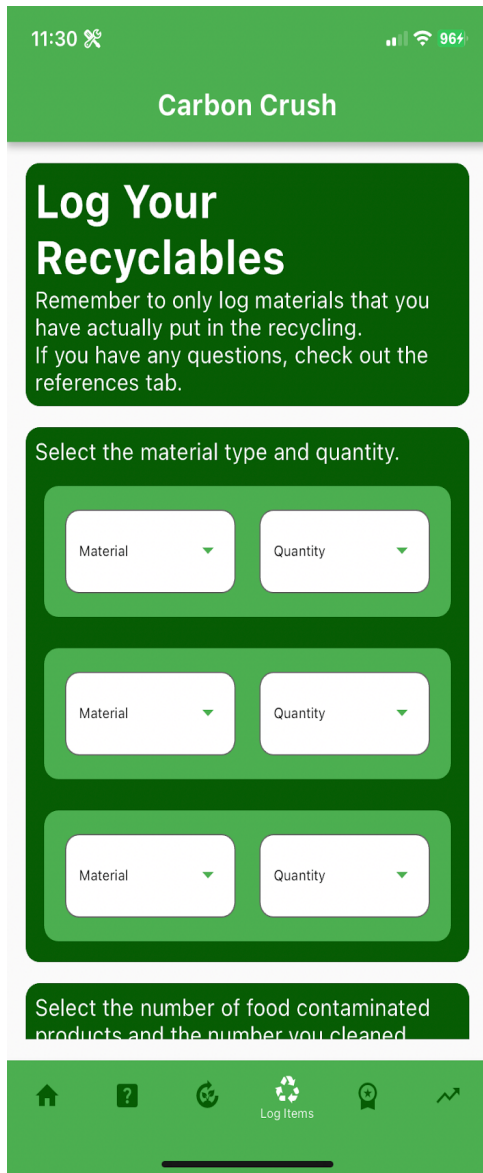
***Resources***



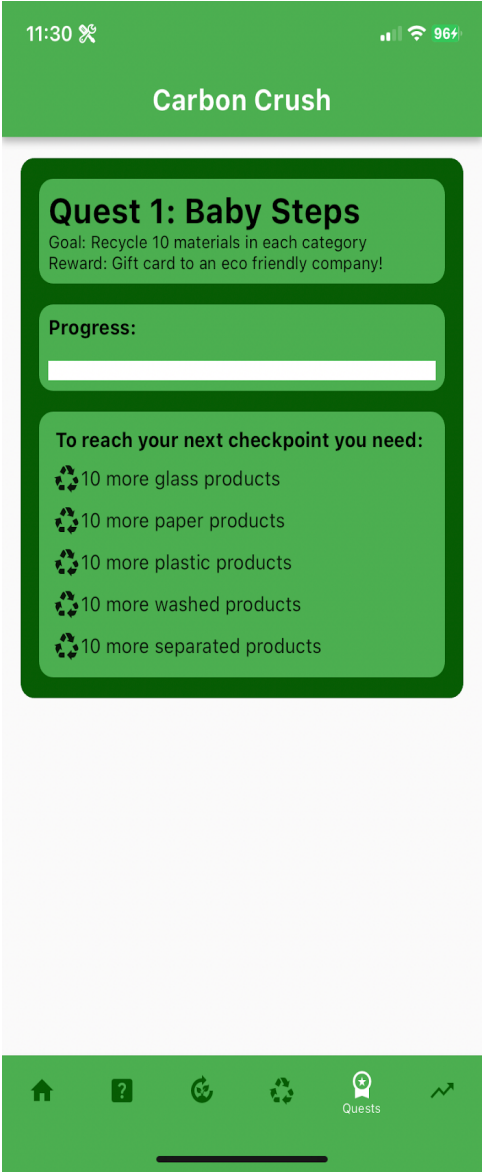
*Carbon Counter*



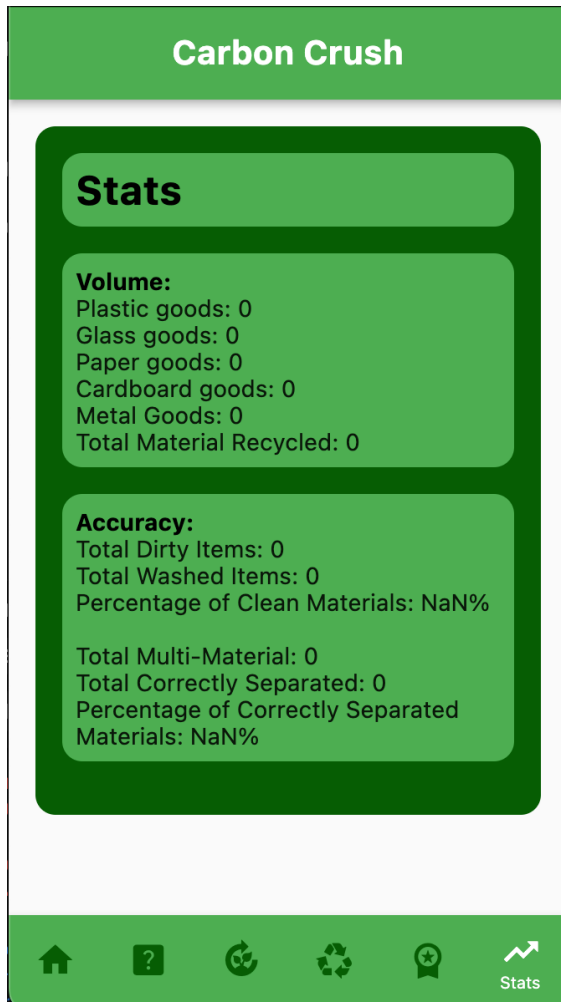
*Log Items*



*Quest*



*Stats*



### Appendix 3: Pre-Survey Questions

The following questions were answered by Local, Remote, and Non-Recycling Senior Citizen participants before the beginning of their in-house testing. The survey was created using Google Forms.

What is your name?
What is your age?
Which testing group are you?
What operating system does your smartphone use?
How do you currently recycle?
How much do you know about proper recycling habits? 1 signifies that you do not know how to recycle. 6 signifies that you are proficient in recycling habits such as sorting and cleaning recyclables.
How motivated do you feel to recycle?

Do you believe that your recycling has an impact on the environment?
What barriers are currently preventing you from practicing proper recycling habits such as cleaning and separating recyclables? (ex. lack of knowledge, time, motivation, etc.)

#### Appendix 4: Testing Information Packet

The linked document was shared with all Local, Remote, and Non-Recycling Senior Citizen Participants. It outlines what is expected of each group throughout the testing process.

Link:

<https://docs.google.com/document/d/1W0wIP7WcdbU55yo4LEjCbwaeFeD8Ry2L9n001f9X6g/edit?usp=sharing>

#### Appendix 5: Post-Survey Questions

The following questions were answered by Local, Remote, and Non-Recycling Senior Citizen participants after concluding their in-house testing with Carbon Crush. The survey was created using Google Forms.

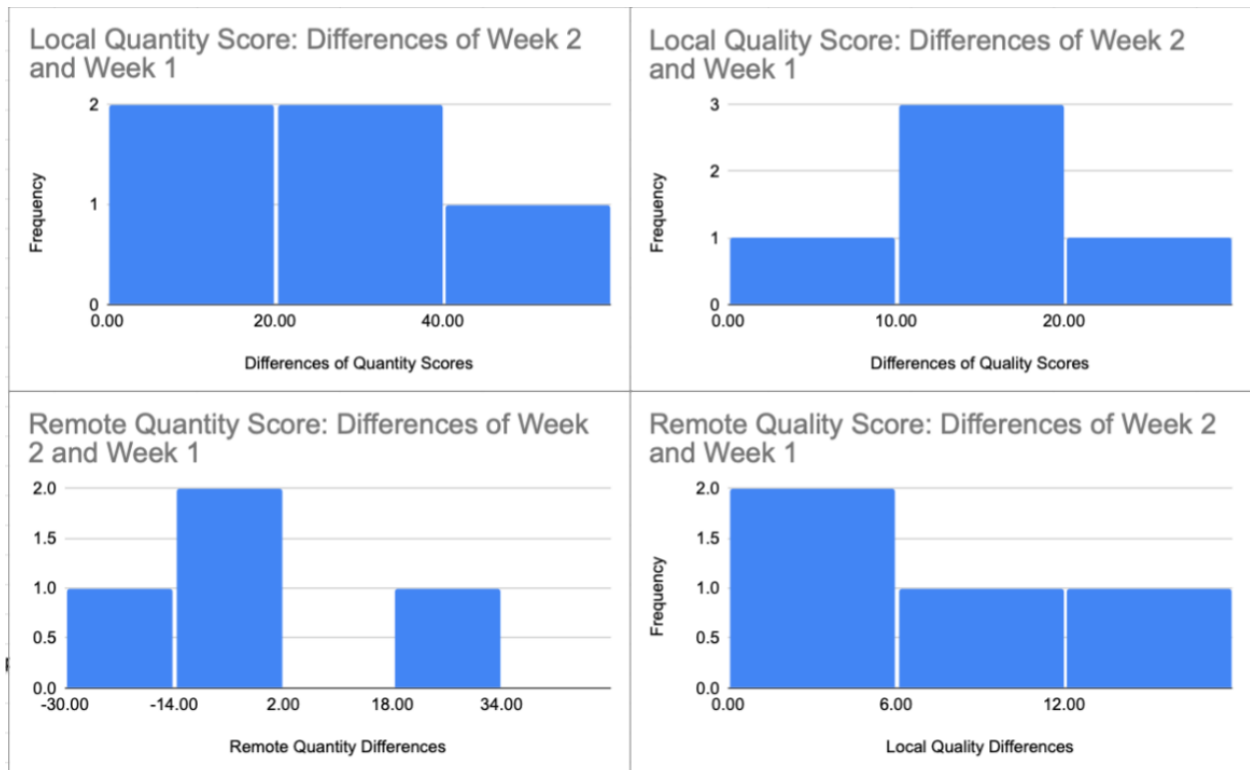
What is your name?
Which testing group are you in?
How much do you know about proper recycling habits? 1 signifies that you do not know how to recycle. 6 signifies that you are proficient in recycling habits such as sorting and cleaning recyclables.
How motivated do you feel to recycle?
Did the app increase your motivation to recycle?
Do you believe that your recycling has an impact on the environment?
Did the app increase your awareness of the impact of your recycling on the environment?
Mark the degree to which you agree that each gamification feature increased your motivation to recycle properly and overcome your barriers to recycling. - Monetary Incentive - Carbon Counter - Stats
Which of the gamification feature impacted you the most?
Why was this feature so impactful?
Did you experience any issues with the app?
In what ways could the app be improved?



Please upload screen shots of your the Home page and Stats page from the recycling app. If you cannot upload them here, please email them to me.

## Appendix 6: Histograms of Local and Remote Participants' Quantity and Quality Scores

The following histograms represent the distribution of the differences of quantity and quality scores for Local and Remote participants. It can be observed that only the differences in Local Quality scores were normal.



## Appendix 7: Limitations and Assumptions

### Limitations:

Listed below are the limitations of my project which were out of my control.

1. External funding was not available to enroll in the Apple Developer program. This limited me to testing my app with users for only one week.

2. Participants were limited to those who I could meet in person to deploy the app from my laptop. This meant that I could not test with individuals outside of the New England area, which I had originally hoped to.

**Assumptions:**

The following statements were assumed to be true for the purpose of this project.

1. Participants provided honest responses in the Gamification Strategy Survey, Pre-Survey, and Post-Survey.
2. Local, Remote, and Non-Recycling Senior Citizen participants produced recycling during their first week of recycling that was a true representation of their unaltered recycling habits.

Additionally, during both weeks, all participants submitted (physically or virtually) all products that they recycled and did not omit materials that they did not clean or separate properly.

3. The samples used for the Gamification Strategy Survey and in-house testing were representative of the population.
4. The trends observed in the present study are predictive of the future.