I

Recycling @ IU

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Our Process

I Research

II Concept

III Prototyping

IV User Studies

I. Research

To begin our project, we conducted research to understand what recycling looks like in Bloomington and more specifically on IU's campus. This research stage consisted of gathering academic articles and studies that gave us a general idea of what recycling is and what it looks like in the U.S and the world as a whole. We then conducted interviews with our peers at IU to gain an understanding of how they perceive recycling and what their attitudes are towards it. Our final piece of research came in the form of observations around IU's campus. We observed numerous locations to get a first-hand look at what exactly the recycling habits are of those living and working on campus.

II. Concept

In order to make sense of our research, we collected all of our data and began to make various affinity diagrams in Miro. Individually, each group member-organized their data from their own interviews and observations in the way they saw fit. We then brought all of our diagrams and data together and made one large affinity diagram that consisted of multiple categories of data as well as all of the connections that we could find between our data points. This process of drawing connections began to reveal a number of problems as well as potential solutions in regards to recycling rates on IU's campus.

III

Our Process

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III. Prototyping

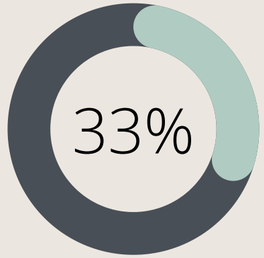
After drawing numerous connections in our Concept stage, we began to brainstorm potential solutions to the problems with recycling we had discovered. All of the solutions considered were unique and tackled at least one, if not more, of the problems discovered in our affinity diagram. Individually, we all designed three solutions that we felt would impact recycling at IU in some manner. We then worked as a team to narrow down and combine our design ideas until we settled on one concept that we felt would be the most beneficial to not only the students of IU but also the residents of Bloomington and Monroe County.

IV. User Studies

Iterations of our final concept were essential to ensuring that it was as beneficial as possible to those who interacted with it. To make these iterations, we needed to run multiple tests with multiple different people in order to get a sense of what needed to be changed. We began this testing process by developing a protocol that included a script to read to participants as well as tasks for them to complete within our prototype. This protocol ensured that all of our participants were receiving the same information and no person was given any advantages. The feedback we received from these tests then influenced the changes we decided to make in each iteration of our prototype.

IV Research

Approximately 1/3 of recyclable waste is diverted from landfills and recovered for recycling.[1]



The average person produces 4 pounds of municipal trash every single day.[1]

66% of college applicants make their college decision based on the school's sustainability practices.[5]

Findings From Articles and Studies

The key takeaways from our research of outside sources gave us a more in-depth understanding of what recycling looks like across the world, the U.S, and on college campuses. The major findings that created a foundation for our project include...

1. There is a phenomenon where **young people were found to often be more knowledgeable and worried about the environment** than older generations, but **they tend to recycle much less** than older generations.[3]
2. **Schools all over the world are working to implement more sustainable practices** on their campuses. They boast impressive stats such as diverting 49% of their recyclable waste away from landfills.[5] **However, we found that IU only diverts 39% away.**[4] While this may not seem like a huge difference, this 10% difference in waste is equivalent to thousands of pounds of trash.
3. Employees working in recycling plants have stated that **the biggest issue they face is waste being disposed of improperly and ruining the recyclable waste.**[2]

V

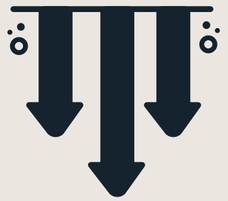
Research

Findings From Interviews

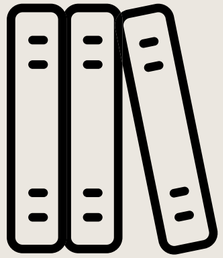
In our interviews with fellow students, we learned what their perceptions of recycling are and why those perceptions are the way they are. In total, we interviewed six students. Some live on campus in dorms and greek houses while others live off-campus in houses and apartments. We learned the following from them...

1. All of them **believed recycling was important, but only a couple of them stated that they recycled to the best of their abilities.**
2. Many students stated that they recycle occasionally and **feel that if they had been educated more on how to recycle properly, they might be inclined to recycle more.**
3. A couple of students noted that there are **some areas around Bloomington and IU lacking recycling resources,** which could contribute to low recycling rates.

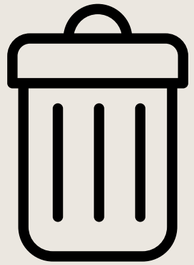
Problems Identified



Lack of motivation among students to recycle



Not enough adequate recycling education being provided to students



Confusing or inadequate recycling resources off campus, in dorms, and in greek housing.

VI

Research

Findings From Observations

Observations were a form of research that gave our team first-hand experience with the recycling habits of students on campus. We observed in the Indiana Memorial Union, Luddy Hall, outside Wells Library, and dining halls to get a number of unique perspectives on recycling at IU. We learned the following from our observations...

1. **There is a huge amount of hesitation among students as they throw away their trash.** They hover between recycling and landfill before finally settling on landfill.
2. Students that showed no sign of hesitation either successfully recycled their materials or **just threw everything away with no regard for whether the waste was recyclable or not.**

The image above was taken inside Luddy Hall where one set of observations took place. This observation in particular took place around three recycling stations. Despite this abundance of resources, students continued to dispose of waste improperly.

Main Takeaway

Students do not have enough recycling knowledge to dispose of their waste confidently, consistently, and correctly.

VII Concept

Designing concepts began with the organization of all of our data into affinity diagrams. We individually made our own affinity diagrams with our data from interviews, observations, and secondary research. We then combined all of our data into one master affinity diagram that can be seen at the right. It is divided into categories, and each category holds sticky notes that represent one piece of information each.

VIII

Concept

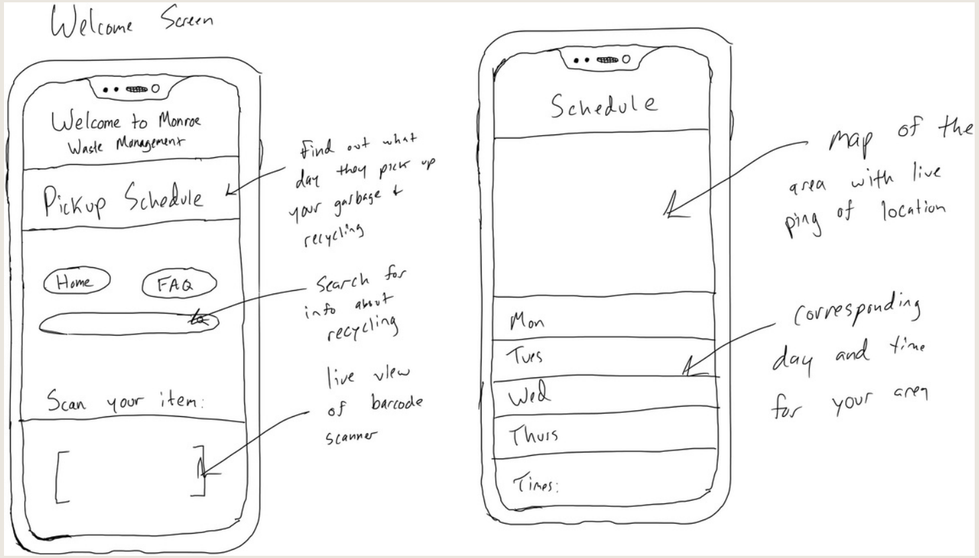
From our affinity diagram, we identified a number of problems and potential solutions.

Main Problems

1. Students are not motivated enough to recycle properly.
2. Students do not have enough education on proper recycling habits.

Potential Solutions

Our team brainstormed a number of potential solutions to solve the two problems to the left. These ideas ranged from an app that inspired competition with recycling, a digital bulletin for recycling stations that educates students on waste disposal, and an app that encourages good recycling habits for all of Monroe County. We settled on the latter, and the first sketch of this app prototype is displayed below.

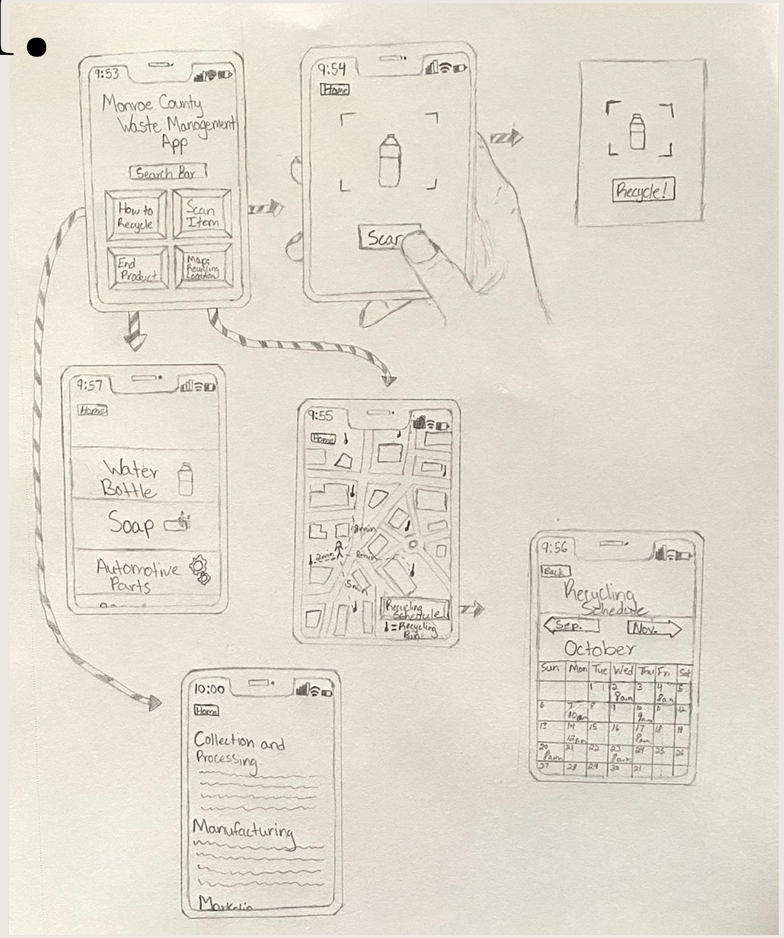


IV

Prototyping

The app we settled on is called the "Monroe County Waste Management" app. It is an app the educates users on recycling with its How to Recycle feature, allows users to scan waste with their device's camera and get information on how to dispose of it properly with the Scan feature, allows users to search for items and learn how to dispose of them with the Search feature, provides a map of recycling stations on campus and recycling plants off-campus with the Map feature, and allows users to find out when their trash is getting picked up with the Pickup Schedule feature. The iterations below are a result of numerous tests with target users. Their feedback gave us insights on what needed to be changed as we went along

1.



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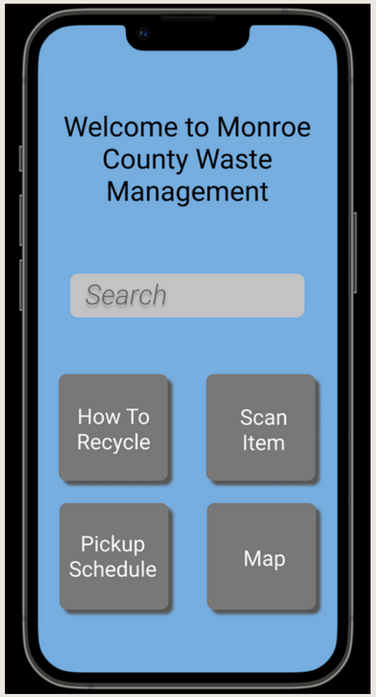


3.

V

User Studies

Methods

In our user studies, we asked 12 participants to complete tasks within our app and give feedback on the app's design and functionality. Users completed these tasks on an interactive prototype, and the feedback they gave allowed us to iterate on the prototype and create a final high fidelity prototype. We developed a user study protocol that was read aloud to participants so that they understood the specifics of the study. They were given details of the project and asked to think aloud as they worked on their tasks. They were also informed that they could leave the study at any time. At the end of the protocol, the tasks at the right were given, and we observed participants as they thought aloud and attempted to complete the tasks.

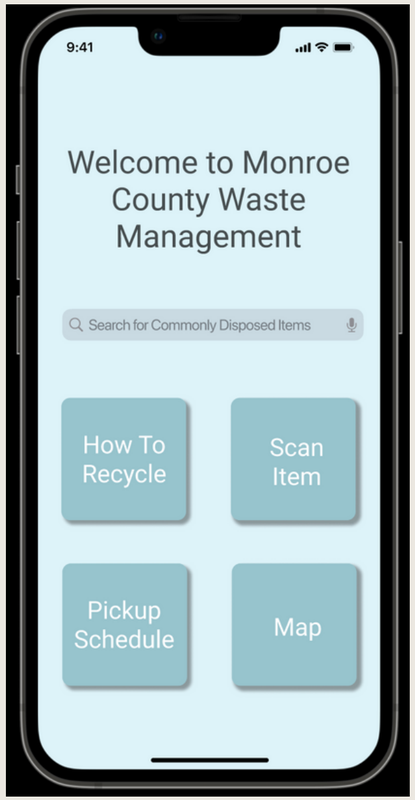
Tasks

1. You have a water bottle sitting in front of you and need to know how to dispose of it properly. Where on the app could you go to find this information?
2. You are on campus and are unsure of where the nearest recycling station is. How could you find the nearest recycling station on the app?
3. You have just moved to a new address and are unsure of when recycling gets picked up. How could you find the schedule for your address in the app?
4. You have just made dinner and need to know if eggshells are recyclable. How could you figure this out using the app?

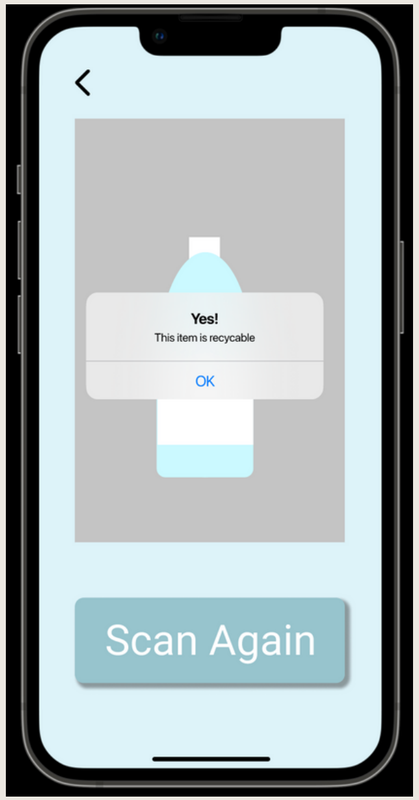
VI User Studies

Users completed tasks by interacting with the screens below.

Home



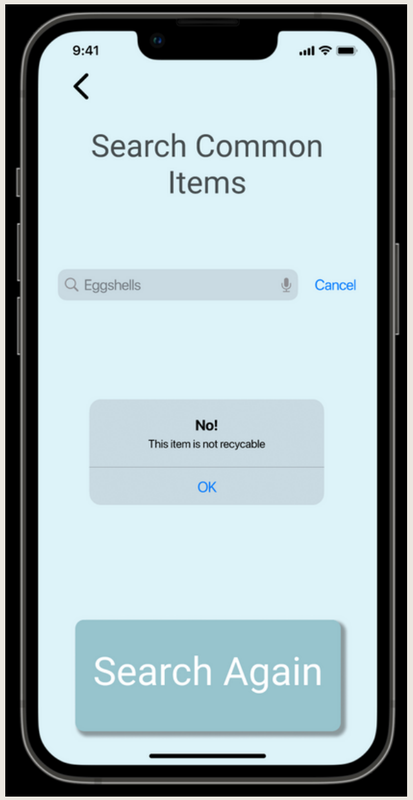
Scan



Map

Pickup Schedule

Search

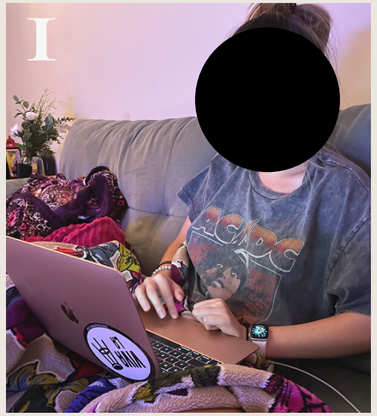


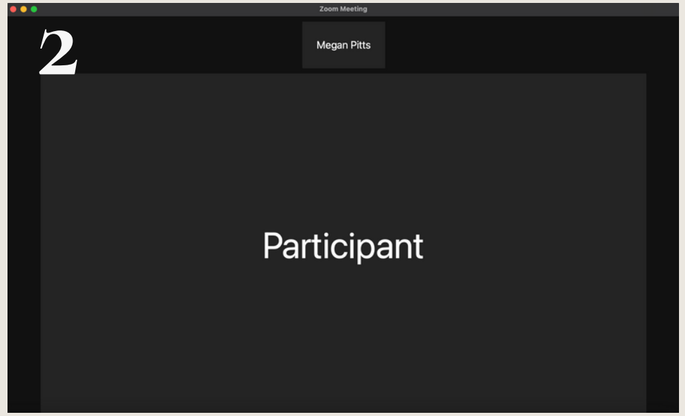
VII

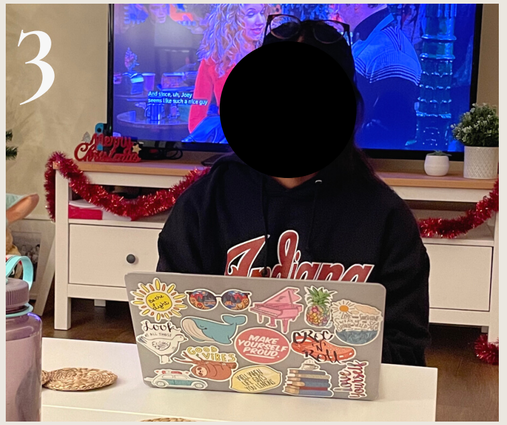
User Studies

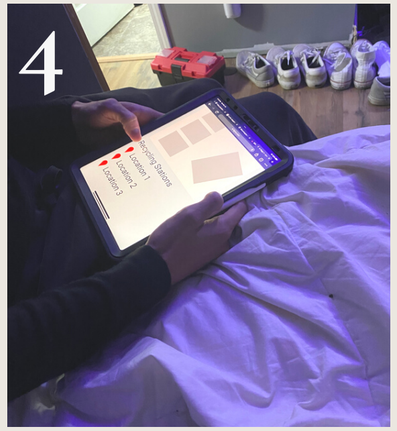
Results

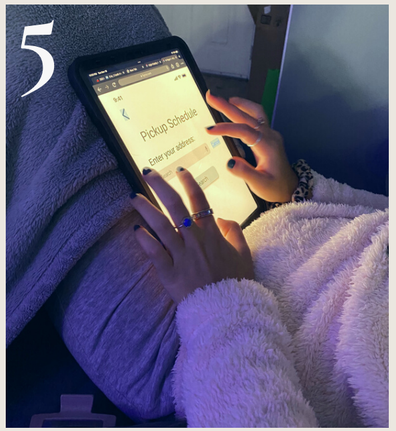
In our user studies that are displayed on the right, most participants found no issue with tasks 2 and 3 that asked them to use the Map and the Pickup Schedule features. However, there was confusion in all twelve tests on tasks 1 and 4 because participants were unable to discern any difference between the Search feature, the How to Recycle feature, and the Scan feature.

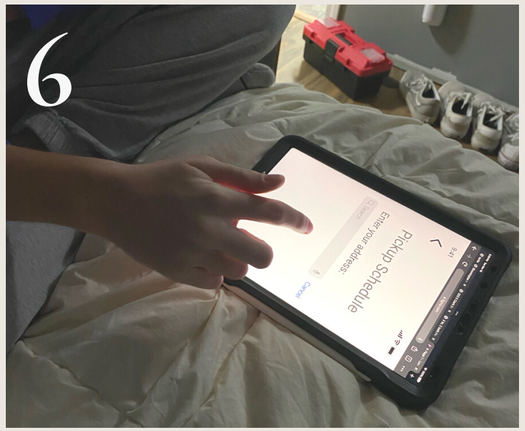






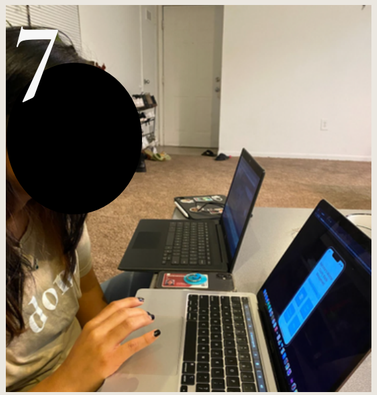


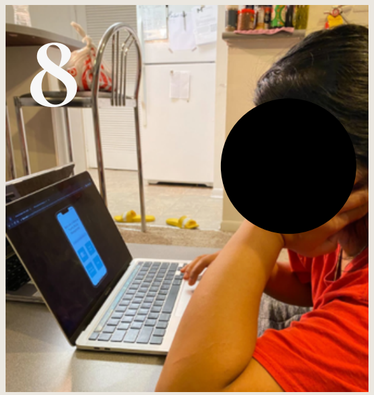


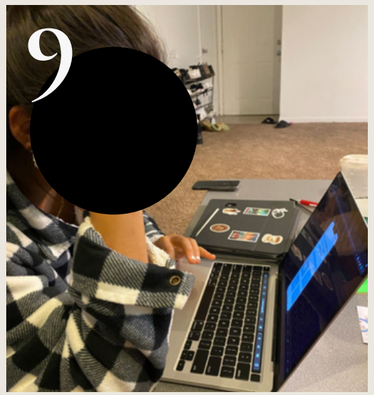


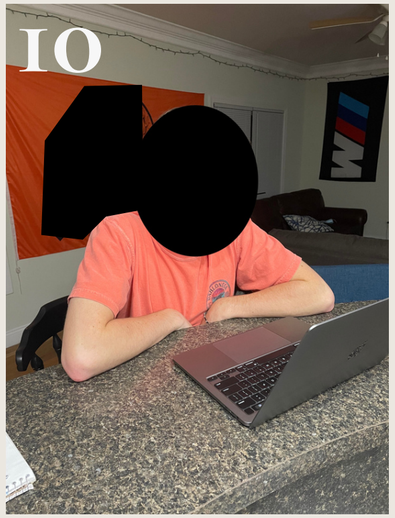
*More information from individual user studies pictured on this slide can be found in Appendix A

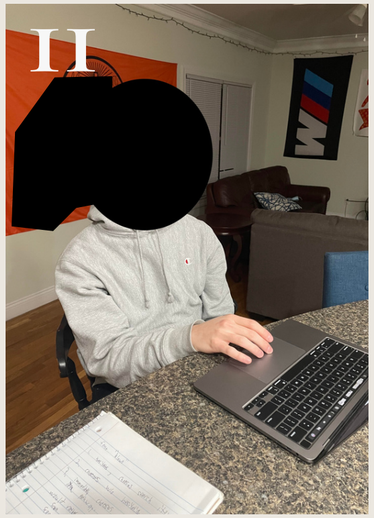
VIII User Studies

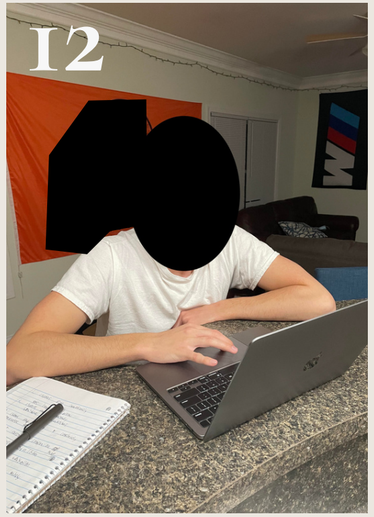












*More information from individual user studies pictured on this slide can be found in Appendix B

Results Cont.

In addition to fixing the Scan, How to Recycle, and Scan features, participants, again pictured on the left, suggested that we change the map so it is more detailed and gives users more information. Participants also stated that they would like to see more educational aspects in the app that teach them instead of just showing them how to recycle.

XIV

User Studies

Iterations

Our team took every piece of feedback we received into consideration and completely revamped the app for the final iteration. We changed the following...

1. Added descriptions to the buttons on the home screen and redesigned the layout of them to make the features and their purposes less confusing for users.
2. Added more detail to the app overall to make it look nicer and more appealing to those who use it.
3. Added more detail to the Map, Scan, and Search features so users are provided with information that's as helpful as possible about how to dispose of their waste.
4. Changed the map so users can click on pins and get details about a recycling station location.
5. Added more detailed information to the How to Recycle section so users are learning from the app.

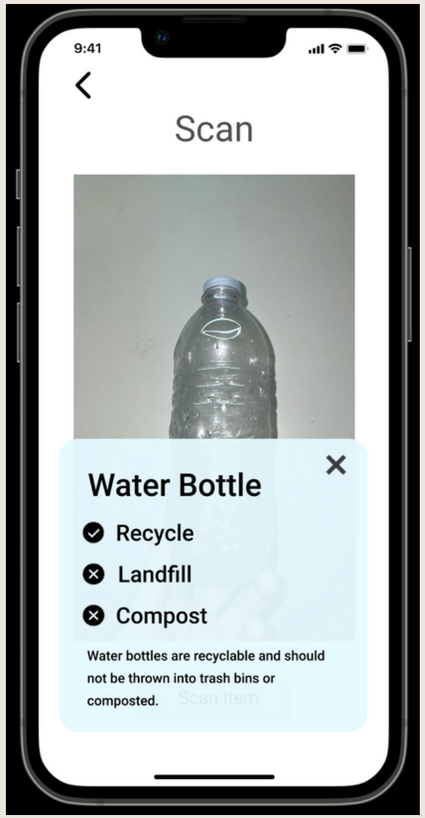
Home

XV Final Prototype

Link:
https://www.figma.com/proto/Btg4okAgg9aqAwLdxW3b2r/High-Fidelity-Prototype?node-id=2%3A2&scaling=scale-down&page-id=0%3A1&starting-point-node-id=2%3A2

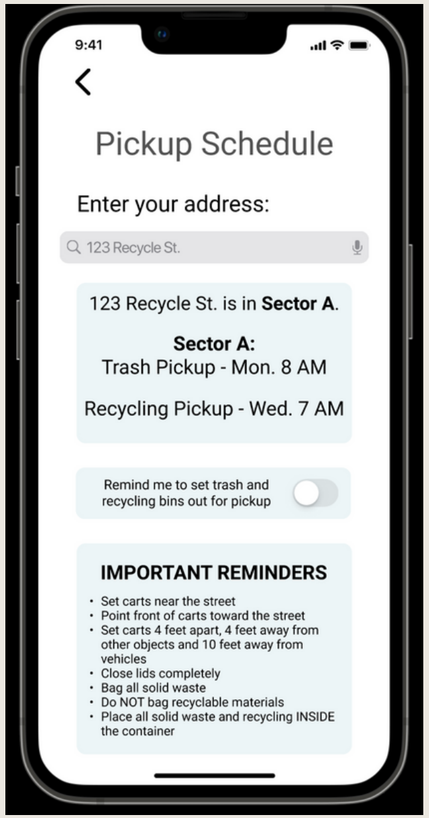
The screens below come from the final iteration of our prototype after user studies.

Scan

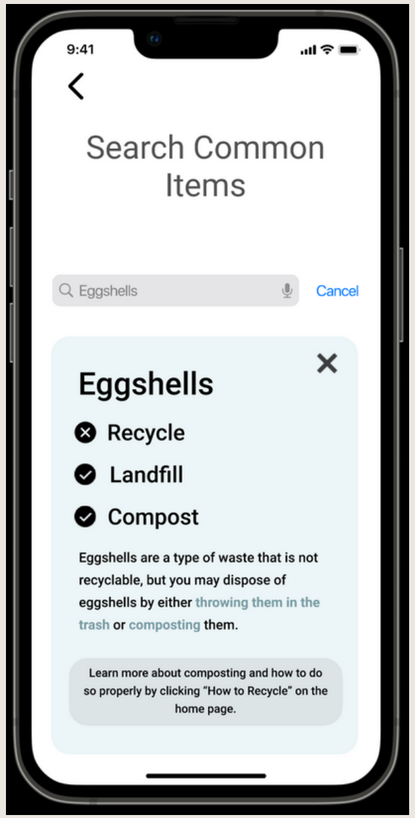


Map

Pickup Schedule



Search



How to Recycle

XVI

Works Cited

Secondary Research Sources

1. L Chase, N., Dominick, G. M., Trepal, A., Bailey, L. S., & Friedman, D. B. (2009). "This is public health: recycling counts!" Description of a pilot health communications campaign. *International journal of environmental research and public health*, *6*(12), 2980–2991. https://doi.org/10.3390/ijerph6122980
2. Hccc. “ASK EARTHA: What Happens When Garbage Is Put into Our Recycling?” High Country Conservation Center, High Country Conservation Center, 6 May 2019, https://highcountryconservation.org/2019/05/06/ask-eartha-what-happens-when-garbage-is-put-into-our-recycling/.
3. Ojala, M. (2008). Recycling and Ambivalence: Quantitative and Qualitative Analyses of Household Recycling Among Young Adults. Environment and Behavior, 40(6), 777–797. https://doi.org/10.1177/0013916507308787
4. Sustain IU, n.d, https://sustain.iu.edu/commitment/resource-recycling/index.html
5. “The Princeton Review Guide to Green Colleges: 2021 Edition Press Release.” The Princeton Review Guide to Green Colleges: 2021 Edition Press Release | Green Guide | Press Release | The Princeton Review, 2021, https://www.princetonreview.com/press/green-guide/press-release.

XVII

Appendix

Appendix A

User Study 1 : This study was conducted by Megan and the picture is numbered "1" on slide 12. In this study, the user had no trouble with tasks 2 and 3, but they were a little confused with the first and fourth tasks. They wanted to click on "How to Recycle" for the first task, but this did not give them the information they needed, and they then chose the Scan feature and completed the task. This happened again with the fourth task between the How to Recycle button and the Search bar. They requested fewer confusing buttons.

User Study 2: This study was conducted by Megan and the picture is numbered "2" on slide 12. In this study, the user again had no issues with tasks 2 and 3, but they found the exact same issues as the participant in the first study did. They suggested making changes to the map so it's more detailed.

User Study 3: This study was conducted by Megan and the picture is numbered "3" on slide 12. In this study, the participant faced the exact same situation as participants from studies 1 and 2 in terms of which tasks were completed with and without confusion. They emphasized adding some sort of description to the buttons so that they're less confusing for users to figure out.

User Study 4: This study was conducted by Matthew and the picture is numbered "6" on slide 12. The user tried to click on "How to Recycle" and then went to "Scan Item", exited, and then went back Scan Item and said that it was “didn't make sense to not be able to use the how to recycle button”

User Study 5: This study was conducted by Matthew and the picture is numbered "4" on slide 12. The user also attempted to click "How to Recycle" but was confused why it didn't work and then went to "Scan Item". The user then went to the "Map" button but then was confused on how to click on the locations at first. The user advised having a show all button and having a checkbox feature for all the locations. The user went to "Pickup Schedule" and found it to be self-explanatory and easy to see where and when it was picked up. The user advised Including a map of the sectors for the pickup schedule and adding a calendar so that you could set reminders.

User Study 6: This study was conducted by Matthew and the picture is numbered "5" on slide 12. The user goes to "Scan Item" and then was confused about how to get back to the main screen. The user then clicked on "Map" then clicked a pin and then tried to use the directions button and was confused why it didn't work. The user got confused trying to search for an address because they tried to actually type.

XVIII

Appendix

Appendix B

User Study 7: This study was conducted by Van and the picture is numbered "7" on slide 13. In this study, the user had a lot of trouble with the first task. Their first instinct was clicking on "How to Recycle" and they were left very confused when it didn't do anything. They were able to complete tasks 2, 3, and 4 with little to no effort.

User Study 8: This study was conducted by Van and the picture is numbered "8" on slide 13. In this study, very similar to the participant from user study 7, this participant had only trouble with task one. They were very confused as to why the "How to Recycle" button didn't do anything and what the search bar was for.

User Study 9: This study was conducted by Van and the picture is numbered "9" on slide 13. In this study, the participant replicated the results of participants from user studies 7 and 8. Their biggest and only trouble was with task one.

User Study 10: This study was conducted by Evan and the picture is numbered "10" on slide 13. In this study, the user was able to easily complete the first task using the scan button as intended. The user was also able to successfully complete the third task, but had some issues on the second one. The user was able to succesfully navigate to the map screen, but believed that it would be easier to navigate the map if there was an icon showing the user's location.

User Study 11: This study was conducted by Evan and the picture is numbered "11" on slide 13. In this user study, the user was able to successfully complete all of the tasks. The user completed the second and third tasks with no hesitation, but was unsure on the first task at first. The user did not know if they should search for the item or scan it, but decided on scanning the item as intended. This user also thought that we should change the colors to something more visually appealing.

User Study 12: This study was conducted by Evan and the picture is numbered "12" on slide 14. In this user study, the user was able to complete the second and third tasks with ease. However, the user was unable to complete the first task as intended. Instead of scanning, the user decided to type out their item in the search bar. When asked about why did chose that route, they believed it was quicker than scanning. The user also commented their distaste on the homescreen layout and font.