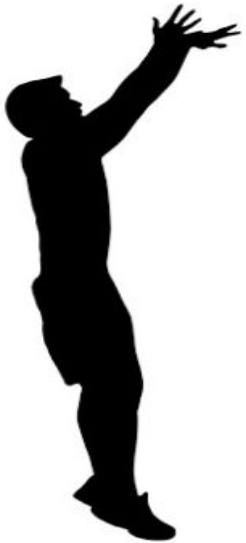


BINZ

Recycling Easy

GNG 1103 C -13

Omar Mortaja ♻ Tahmeed Khan ♻ Noah Jewett ♻ Panagiota Sarsaroudi

Background

Background

Recycling can be as easy as a 3-point shot!

Our mobile application BINZ can:

- advise the customer on how to properly dispose of them
- accurately recognise recyclable objects using Vuforia's advanced AR Recognition

Problem Refinement and Design Criteria

List of Client Needs

User Needs

- Easy to Use
- Widely accessible and compatible.
- Available to as many potential users as possible.

Functionality Requirements

- Helps users recycle everyday items.
- Helps users recycle items that cannot be placed in bins (e.g. batteries).
- Adjust recycling method for contaminants

Additional Requirements

- Track how much and how accurately the users are recycling
- The solution is scalable

Empathize: Design Criteria

Functional Requirements	Importance
> Usable on multiple platforms (iOS & Android)	5
> Ability to accurately Identify waste items (%)	5
> Uses camera features to facilitate recycling	4
> Outputs recycling method for a waste	5
> Provides information about locations for disposal of irregular recyclable items	4
> Identifies which bin to use for different recycling methods	5
> Adjusts recycling method for contaminants	3

Constraints	Importance
> Cost ($)	4
> Storage (MB)	2
> Device Requirements (Model + OS)	4
> Screen Size (Inches)	3
> Capture and Display Resolution (Pixels)	4

Non-functional Requirements	Importance
> User-friendly navigation and interface	5
> Clear and concise tutorial	4
> Multi-language	2
> Usable in Different Places	3
> Tracks User's Recycling Activity	2

*“Our client, Mitch Bouchard, seeks a **user-friendly** and **widely-accessible** product that helps people recycle more **conveniently and reliably**. The product should **reliably identify recyclable items** and **inform the user of the proper measures needed to dispose of them**”*

Benchmarking

Junker

- Barcode Scanning Feature
- Manual Item Search
- ~50% Scanning Accuracy
- Only works in Italy

Eugene

- Costly (€ 79)
- Barcode Scanning feature (could not test accuracy)

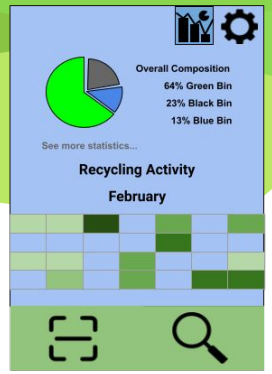
TOwaste Toronto

- No scanning feature
- Recycling Database and Manual Item Search
- Shows locations of where items could be recycled

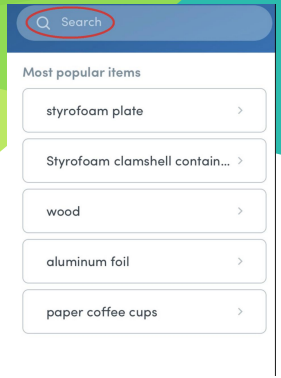
Conceptual Design

6 Different Subsystems

- User Interface
- Scanner
- Manual Search
- Recyclable Item Database
- Directs User to Correct Recycling Bin
- Tracking User Recycling Activity

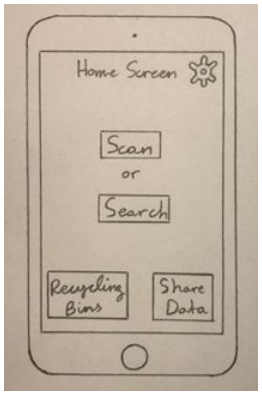


Tahmeed's Information Page



Omar's Manual Search Page

Tahmeed's Scanning Page



Panagiota's Home Screen

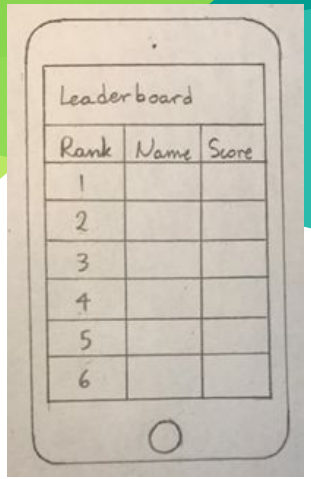
Noah's Scanning results Page

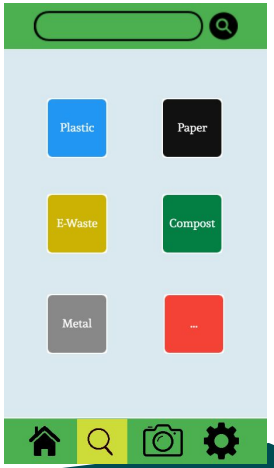
Specification	**Importance (1-5)**	**Global Concepts (Score 1-3)**			
		Omar	Tahmeed	Noah	Panagiota
Ability to accurately identify a waste item	5	Google reverse imaging, 3d scanning, Vuforia (All require testing)	Vuforia	Reverse google image search to find name of object	Vuforia for scanning barcode
Identifies which bin to use for different recycling methods	5	Provides object name and designated bin	Displays Material Name, Bin and Nearby Recycling Facilities	If an object is recyclable, the app tells user which bin to place it in	Shows the recyclable materials the item is composed off and provides information for each bin
Adjusts recycling method for contaminants	3	Displays specific actions to do before recycling(how to treat food contamination, and separations)	None	Provides notes in an item's database page that explain how to treat contaminated items	None
Total Score (Out of 189)		**176**	164	158	169

Chosen Concept

Amalgamation of Individual Ideas

- User Interface → Navigation Bar
- Item Identification → Manual Search and Scanner
- Display how to Recycle Item → Pop-ups
- Give User Feedback on their Recycling → Leaderboard



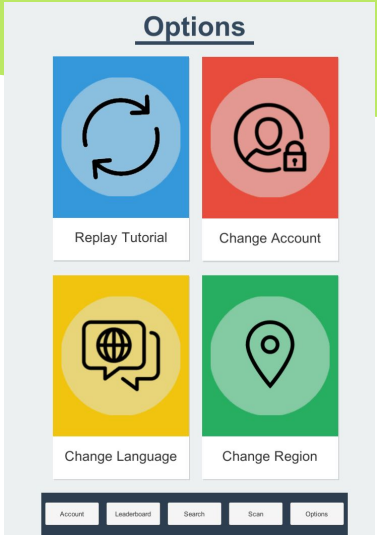


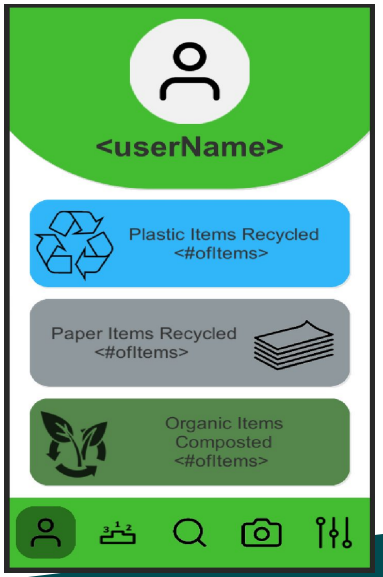
Prototype 1

GNG1103 Section B - Group 13

Prototype 1

- Focused Prototypes
- User Interface
- AR Item Scanner using Image & Cylindrical Targets





Prototype 2

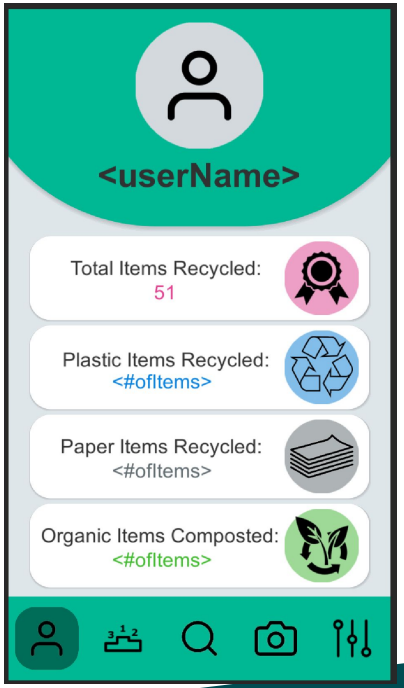
Comprehensive Prototypes

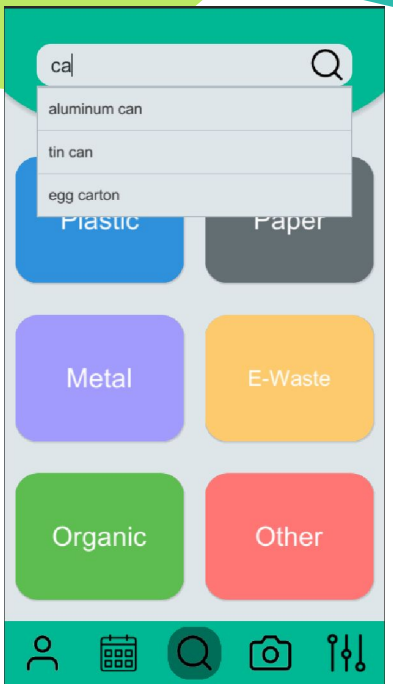
Prototype 2

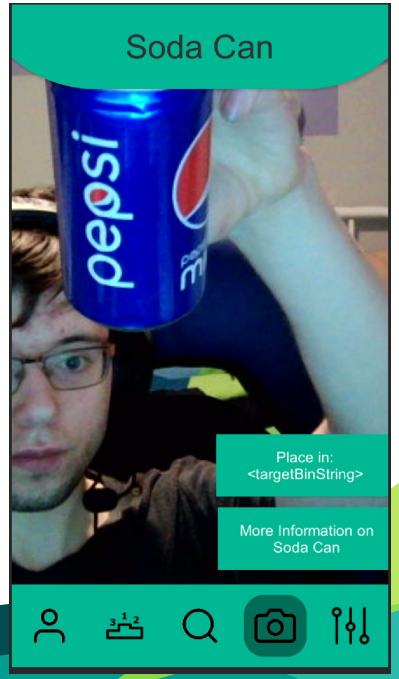
- Combining Focused Prototypes

Further Progress On

- User Interface
- AR Item Scanner
- Leaderboard



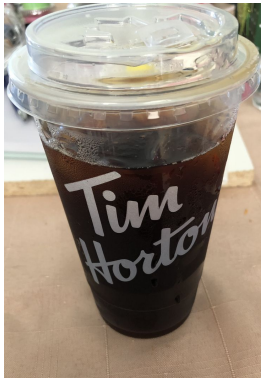




Prototype 2: Scanning Progress

Image Targets

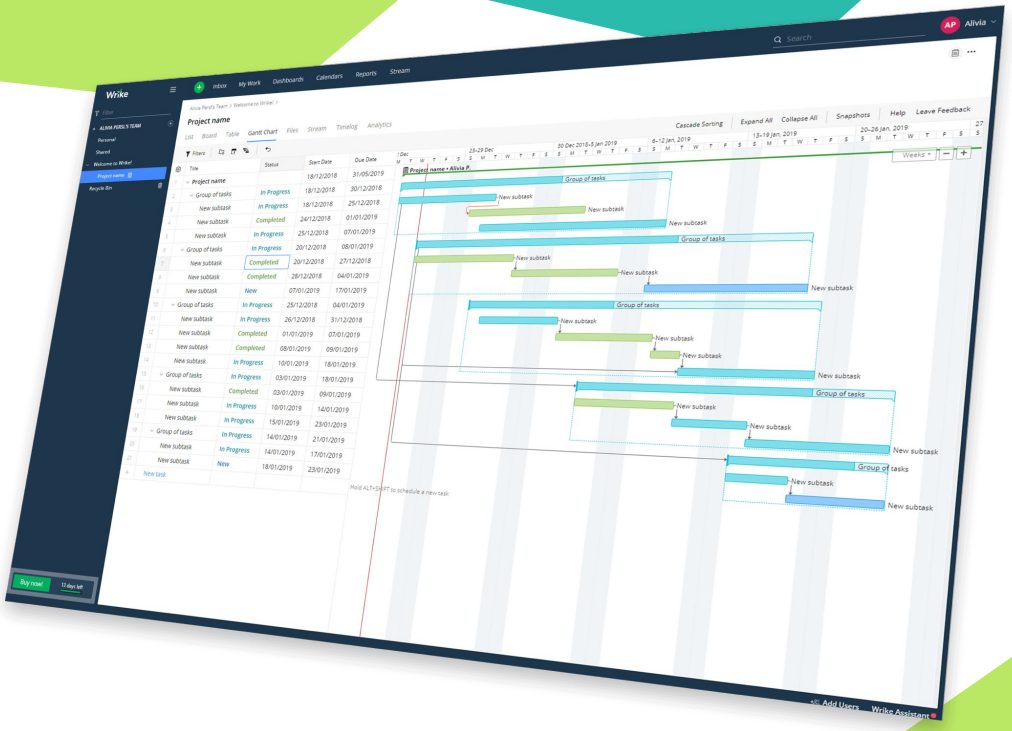
Cylindrical Targets



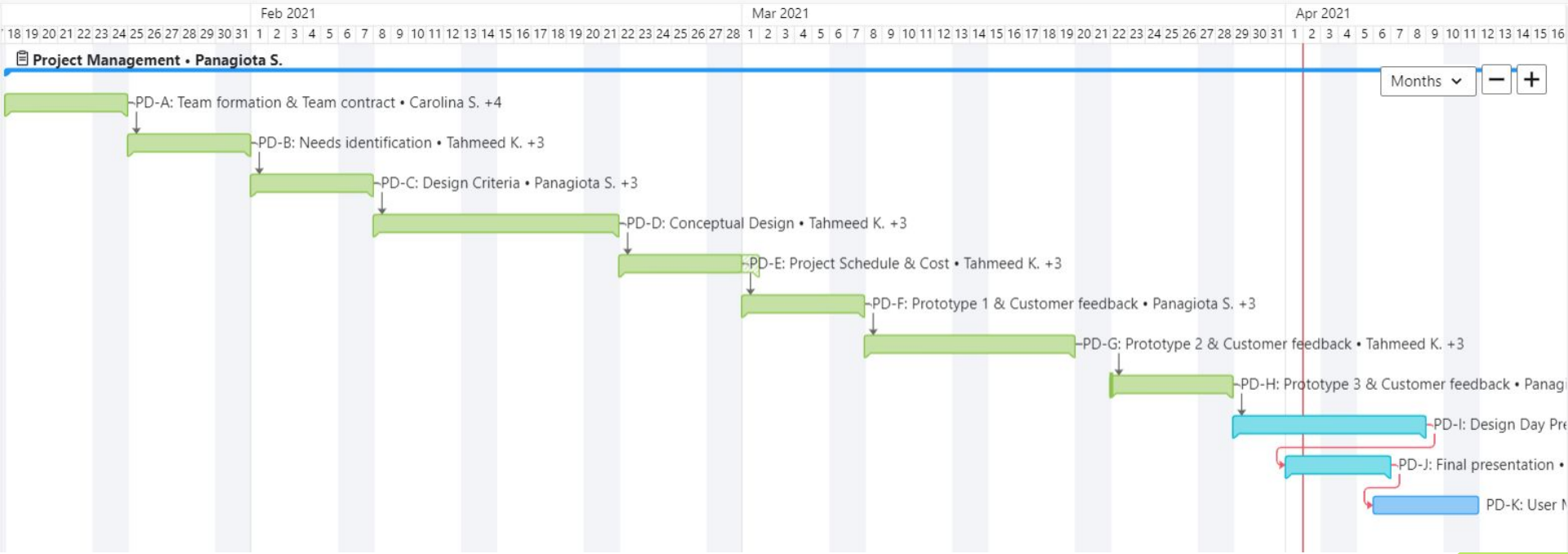
Planning & Managing Tasks

Wrike:

- Team meetings
- Task ownership
- Milestones
- Task dependencies
- Due dates



Task Planning



Prototype 3
Demo

★ Final Prototype Specifications

No.	Metric	Units	Target Value	Tested Value
1	Usable on multiple platforms (iOS & Android)	N/A	Yes	IOS not tested
2	Uses camera features to facilitate recycling	N/A	Yes	Yes
3	Ability to accurately Identify waste items	%	Yes	Yes
4	Outputs recycling method for a waste	N/A	Yes	Yes
5	Provides information about locations for disposal of irregular recyclable items	N/A	Yes	Yes
6	Identifies which bin to use for different recycling methods	N/A	Yes	Yes
7	Adjusts recycling method for contaminants	N/A	Yes	Yes
8	Cost	$	<$100	$25 Google Play Games
9	Storage	MB	<1000 MB	133 MB (Android)
10	Device Requirements	OS	IOS 12.0+ Android 5.0+	IOS 11.0+ Android 7.0+
11	Display Size	Inches	Any Size	Most Screen Sizes
12	User-friendly navigation and interface	N/A	Yes	Yes
13	Clear and concise tutorial	N/A	Yes	No
14	Multi-language	N/A	English/French	Yes
15	Usable in Different Places	N/A	Yes	Only Ottawa
16	Tracks User's Recycling Activity	N/A	Yes	Yes

User Feedback

Prototype 1 - Ebin (TA):

> “I like the scanning area, but it is a bit useless if it stays in one location. Once the scanner identifies an object, you could have the user click a button that says ‘scan this item’”.

Prototype 2 - Juan (Unity Developer):

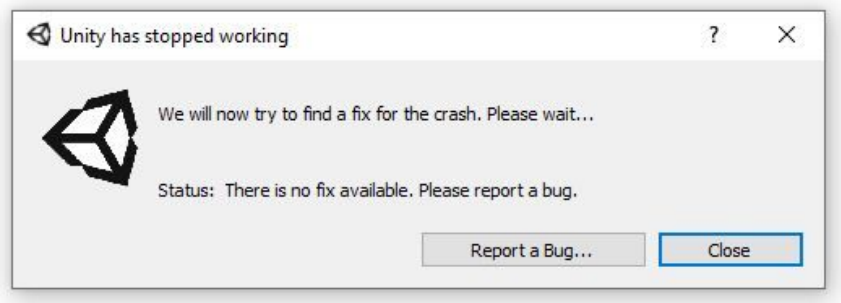
> “The footer for the app seems a little large”.
>
> “Familiarize yourself with anchoring features to appropriately scale UI elements, especially on mobile platforms.”

Prototype 3 - Juilo (Neighbour)

> “Really impressed, never though an app could do something like that”.

Challenges

- Setting up developer account for leaderboard
- Sharing work on GitHub
- Lack of Programming Experience
- Models used for Object Tracking

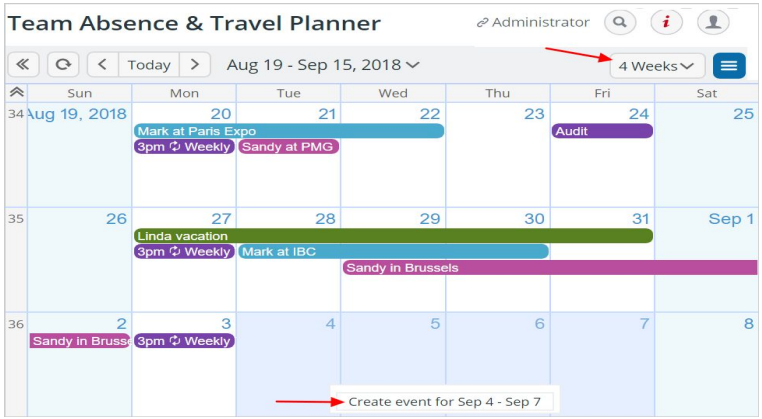


Lessons Learned

- Time Management
- Proactive and Consistent communication to keep everyone on the same page
- Improve testing scenarios
  - Simulate the testing environment as accurately as possible

Future Developments

- Leaderboard + Achievements
- Calendar
- More databases for different locations



#	Avatar	Name	Quests	Credits	Grade
1		GamiPress	32	500	S
2		Ruben Garcia	12	400	A
3		Anthony Cole	5	300	A
4		Irene Berna	7	200	B
5		Jhon Doe	7	200	C

Thank You
Any Further Questions?