SQUANDER

FALL 2022 CAPSTONE PROJECT | PROF HENRY WONG

Aakansha Agarwala
Austin Blaise
Nicholas Wong
Rajat Nagavkar
Suryadeep Nallana

AGENDA

- Team Members
- Project Overview
- Personas
- Technologies
- Design Architecture
- Sprint Overview
- Product Backlog
- Sprint Backlog
- Retrospective
- Future Sprint
- Project Demo
- Conclusion

TEAM MEMBERS: ROLES AND RESPONSIBILITIES

Aakansha Agarwala: Project Manager/Scrum Master
1. Led team meetings and kept the team on task
2. Maintains the project's GitHub repository and Wiki
3. Documented test cases and co-authored technical paper

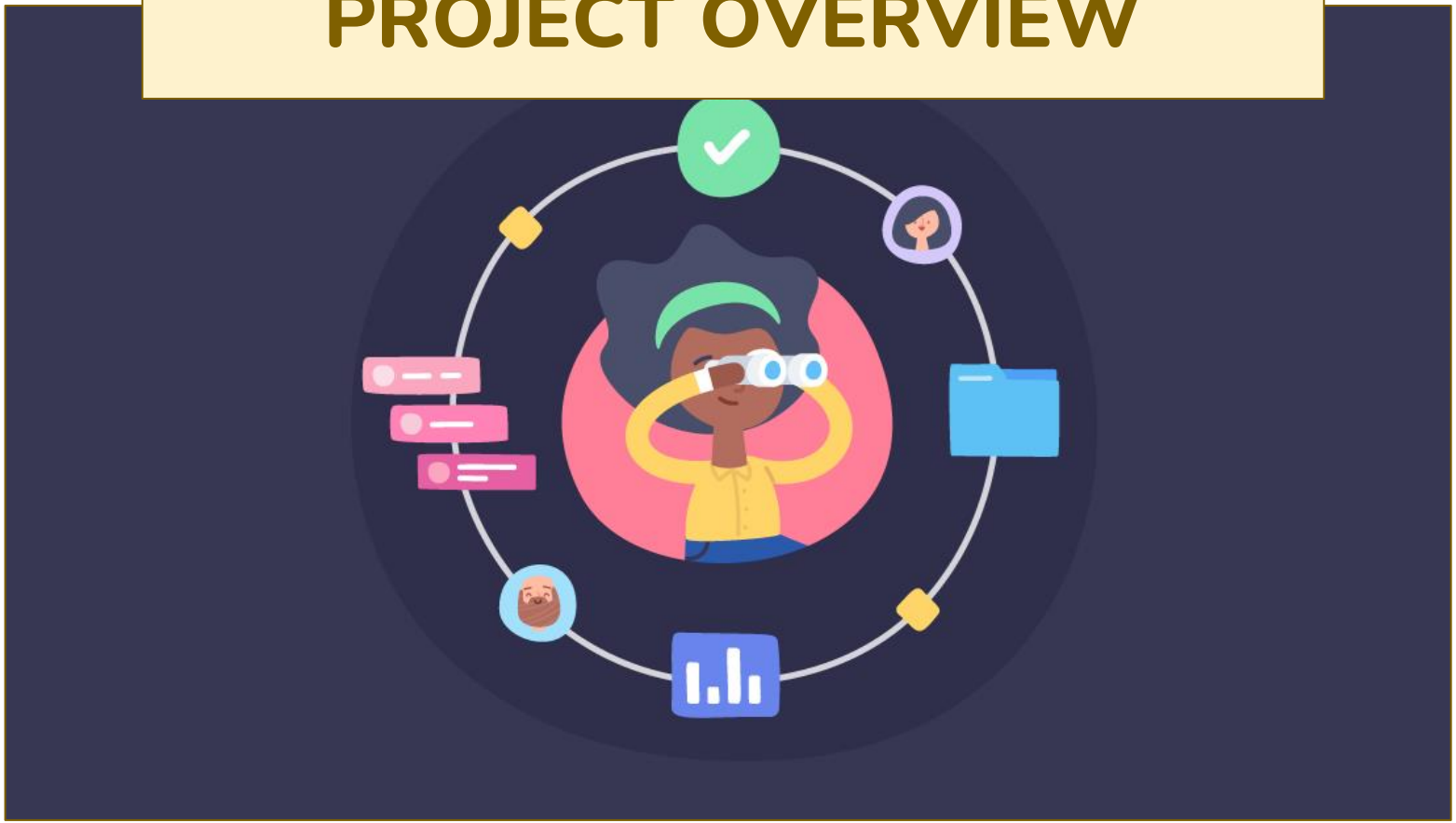
Austin Blaise: Cloud Engineer
1. Contribute to the architecture of the project
2. Creates Infrastructure as code
3. Integrated features and services

Nicholas Wong: Machine Learning Engineer
1. Design Computer Vision Model Architecture
2. Train and Evaluate Model Performance
3. Gather representative image data for training

Rajat Nagavkar: Ios Developer
1. Design and Development of Application.
2. Integrating ML model to provide specified results.
3. Testing the app to provide a better user experience.

Suryadeep Nallana: FullStack Developer/Quality Analyst
1. Contribution to design and development of the app layout
2. Authored technical document of the project
3. Working towards making our app user-friendly

PROJECT OVERVIEW



PROBLEM STATEMENT

As the population is increasing the amount of waste produced is also increasing.

The world produces 2.01 billion tons of urban solid waste yearly, with the United States being the highest producer of waste.

Most of the waste produced remains unprocessed due to a lack of recycling knowledge.

Squander app overcomes this problem by providing a way for waste recycling through a machine learning platform.

PROJECT DESCRIPTION

Squander app provides a complete solution to organize and plan the disposal of waste. It uses a machine learning algorithm to detect recyclable waste from images and provide proper disposal.

Squander app is an Image-based Waste detection mobile application.

The app works with an image submission by the user and a trained machine learning-based model runs on the image which gives results and information about that image.

As Squander is an image-based application, it’s an easy tool to detect waste by underlying simple steps in the application.

And the application also has a feature that provides the nearest recycling location with an option to schedule a pick of your waste by the recycling factory

PERSONA

Jill, the party host

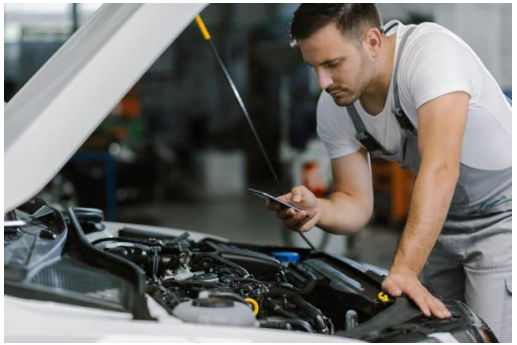
Background Profile:

Jill, a 32-year-old. He is an event organizer of a well-reputed company in the city. He has organized many big parties and is always busy with his job. He takes all the responsibility and his duties also include providing a good food service. He gets many clients, particularly for the food he provides. His organization is popular among the people Jill does many parties and he collected more food waste by the end of the party. Jill would like to know the waste identified from the image uploaded so that he can confirm the photo he uploaded was processable.

How can Squander help?

Jill being responsible for organizing the party. He wants to recycle all the waste by segregating in rightful manner and help the surrounding environment. He can use an application. Squander which provides his needs by showing the results of nearest recycling company location for all the food waste from his parties that happen wherever in the city. Squander makes an efficient and easiest way in someone's life like Jill's

Simon, the mechanic



Background Profile:

Simon is a mechanic for ten years. His age is of 35 years. His jobs is to inspect and repair vehicles, machinery, and light trucks. And he is known for his good service providing for his customers. He works in an indoor garage. Simon's culminated with metallic waste from his work and he wants to find a recycling location to recycle it and make some money from scrap

How can Squander help?

Simon can use the Squander application that helps him to find the nearest recycling company location for the waste to recycle from the comfort of his garage. This would allow him to find and provide easy access directly to the recycling company. He doesn't have to worry about the waste and where to recycle it. Through Squander it makes his life easier.

David, the retiree

Background Profile:

David was a sale executive in a marketing firm. He retired from the job recently. He was successful and has been an inspiration for others in the company. After his retirement, David brought up the interest he had for quite some time to renovate his house. He wants to give a personal touch to the house and lead the rest of his life happily in his way. Now he is spending all his time taking care of the process under his supervision and making a beautiful house for himself

How can Squander help?

Squander can be helpful for David, as he is looking after the construction works for his house. The waste can generate a lot, with all the accumulated waste, he can recognize the waste under categories within the app and send it to his nearest garbage station. That’s make David being responsible for his waste and keeping the environment at a better position.

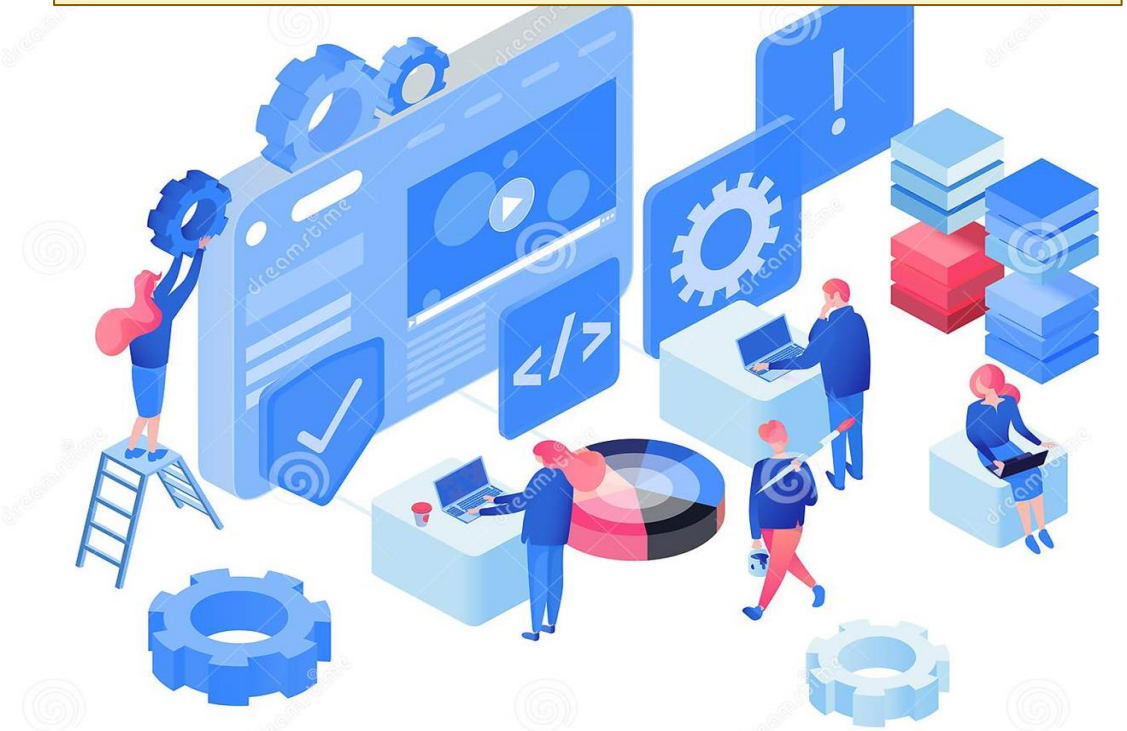
MINIMAL VIABLE PRODUCT

MINIMAL VIABLE PRODUCT (MVP)

Features:

- Map integration with nearby recycling factory locations
- Scheduling the pick up of recycling waste by the factory
- Creation of a User Profile for each user who uses the application
- Showing the History of a pickup that is scheduled by a user
- Showing the recycling statistics for each user

TECHNOLOGIES



TECHNOLOGIES USED

Machine Learning API

Backend

Integrated Map API

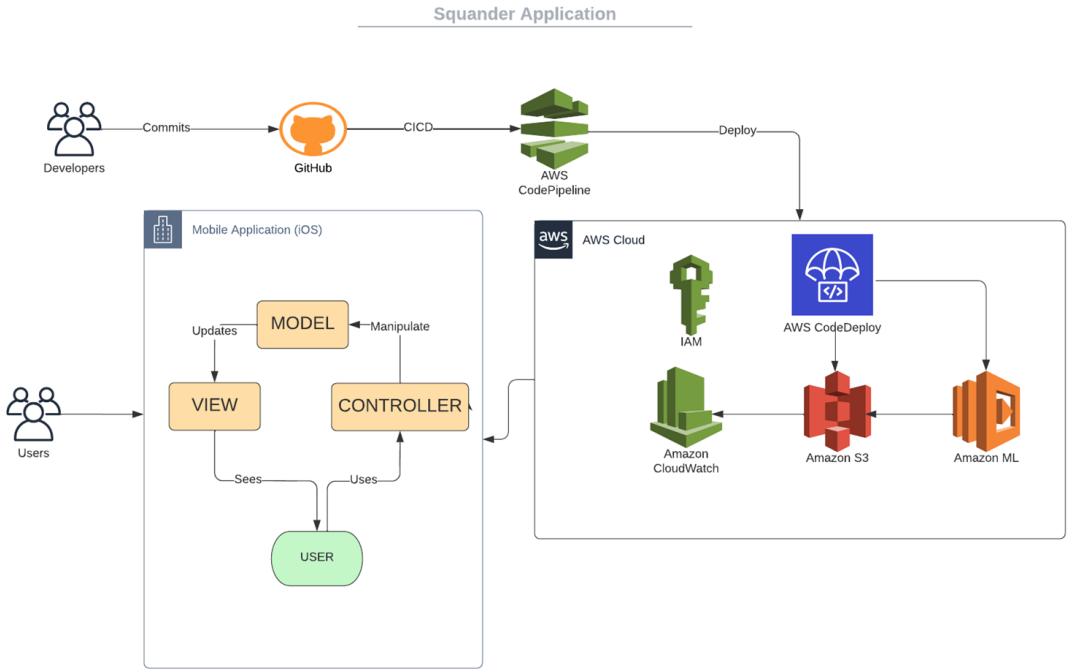
Machine Learning Library

AWS Cloudformation

iOS Development Toolkit

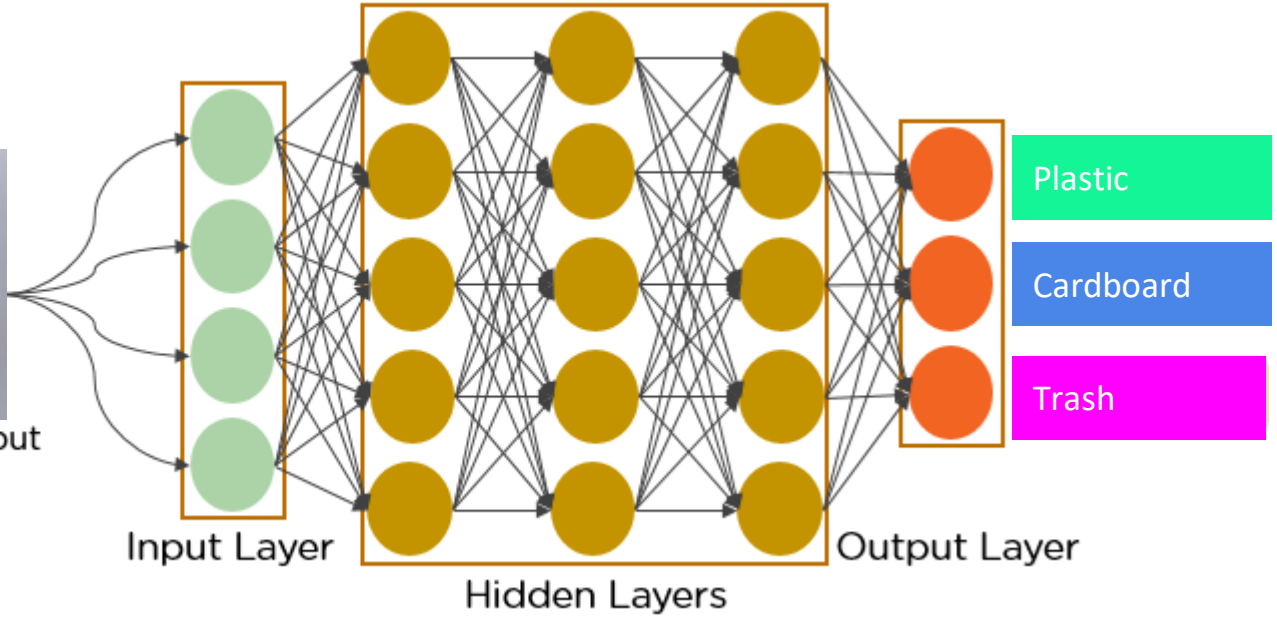
ARCHITECTURE DESIGN

SQUANDER ARCHITECTURE



MACHINE LEARNING ALGORITHM

Pixels of image fed as input



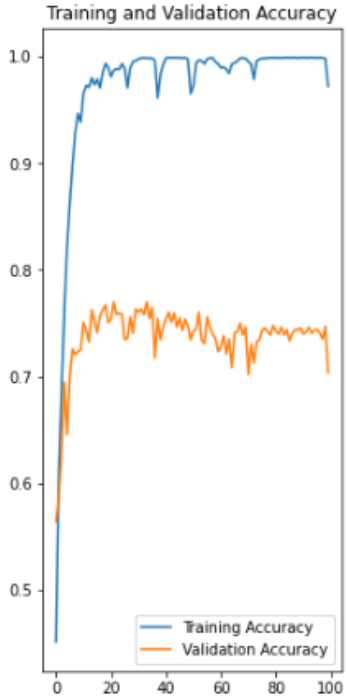
MODEL CLASSIFICATION

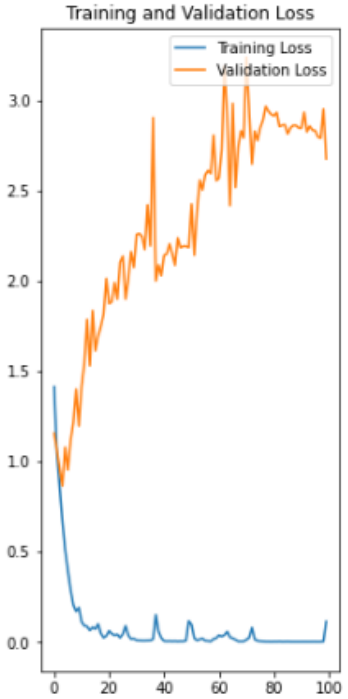
The model is able to classify trash into the following categories:

- Cardboard
- Glass
- Metal
- Paper
- Plastic
- Miscellaneous Trash

MODEL EVALUATION

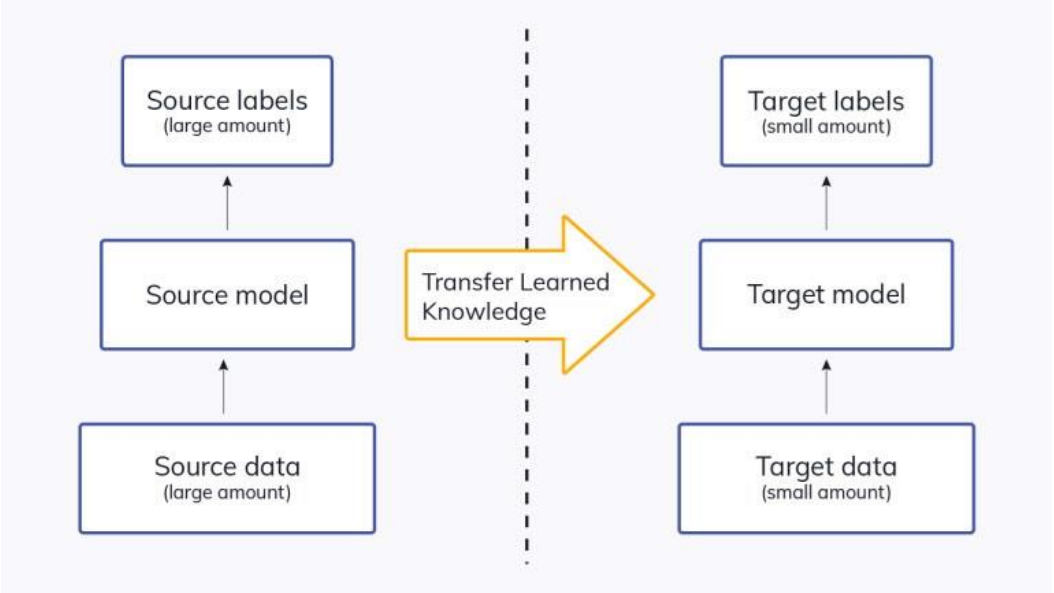
This image most likely belongs to glass with a 100.00 percent confidence.



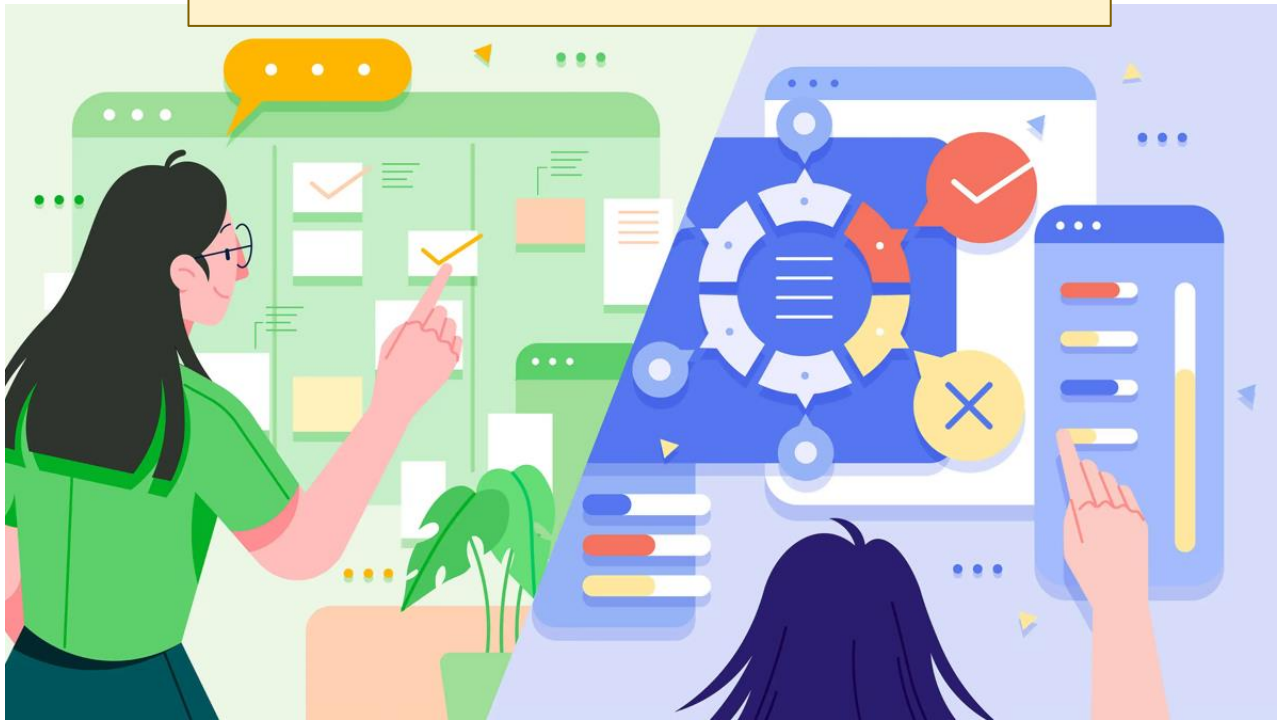


Transfer Learning

- To alleviate the need for more images due to lack of public resources
- Leverage a pre - trained model with a large amount of training data.
- Fine tune the existing model.

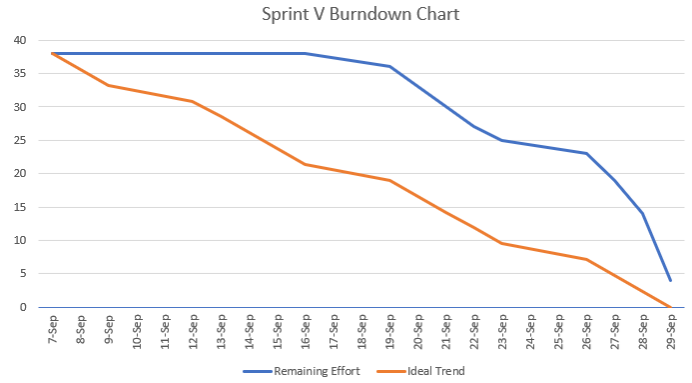


SPRINT OVERVIEW



SPRINT 5 RECAP

SPRINT 5 (09/08 - 09/28)			
KEY	SUMMARY	PRIORITY	STATUS
SQD 52	As a mechanic, Simon wants the Squander Service to be available throughout USA	High	DONE
SQD 53	As a retiree, Davin wants to have the Squander app team contact information	Medium	DONE
SQD 56	Design the Navigation bar	High	DONE
SQD 57	Update GitHub and Wiki Page	Medium	DONE
SQD 58	Update Technical Paper	Medium	DONE
SQD 59	Create Deliverable 5 Presenatation	Medium	DONE
SQD 60	Create Deliverable 5 Pre-Recorded Video and Edit	Low	DONE
SQD 61	Improving the model accuracy	Medium	In-Progress
SQD 62	Working on Deploying and building the AWS Resource for the	Medium	In-Progress
SQD 63	Test Cases for Navigation Bar	Low	DONE



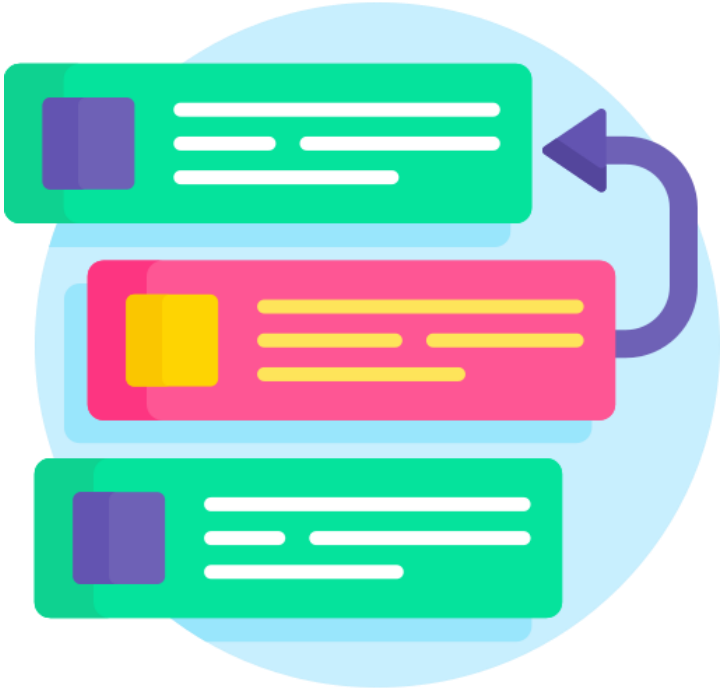
SPRINT 5 vs SPRINT 6

SPRINT V	SPRINT VI
Determined and mapped out goals for future deliverables.	Recycling Location Feature is added
Navigation Bar feature is added in our application	Map View of Recycling Location is added
Model confidence value improved	Model confidence value improved from Sprint 5
Researched necessary technologies to achieve our goals	Automatically load all relevant recycling locations once the image is selected based on it waste type

Improvement From Professor Feedback

- User Stories and Acceptance Criteria
  - Updated the User Stories and Acceptance Criteria Format in the correct format of Given When and then.
- Velocity Chart
  - Updated the chart by adding one more column of ratio and calculated the average.
- Minimal Viable Product
  - Updated the Minimal Viable Product slide with all the relevant points
- Remove Project Requirement slides
  - The project Requirement slide is removed from the presentation deck
- Slide placement
  - Updated the slide placement as per the checklist provided and made sure that we go in order.
- Retrospective
  - Updated the Retrospective Slide with the actual meaning of the Retrospective in agile where we iterated that what went well as a team and what needs improvement, and tried to find a better resolution

BACKLOG



PRODUCT BACKLOG

KEY	SUMMARY	PRIORITY	SPRINT	STATUS
SQD 62	Working on Deploying and building the AWS Resource for Squander	Medium	Sprint 8	TO DO
SQD 61	Improving the model accuracy	Medium	Sprint 6	DONE
SQD 64	As a retiree, David wants to Automatically load locations so that he can have a better user experience and easy to use application.	High	Sprint 6	DONE
SQD 65	As a homeowner, Mark wants to view details of the recycling location so that he can have a conversation with the company with any queries and know all the details of the working hour	High	Sprint6, Sprint 7	In - Progress
SQD 66	Design and Deploy AWS API Endpoint	Medium	Sprint 8	TO DO
SQD 67	As an engineer, John wants to view multiple recycling locations so that he can choose to navigate to one most accessible	HIgh	Sprint 6	DONE
SQD 68	Work on UI/UX and add more feature on Navigation Bar	Medium	Sprint 7	TO DO
SQD 74	As a mechanic, Simon wants to support a map view so that he can plan his route more intuitively	High	Sprint 6	DONE
SQD 72	As a homeowner, Mark wants to know about the Frequently Ask Question screen so that he can get answers to some of the commonly ask question.	High	Sprint 7	TO DO
SQD 73	As an engineer, John wants to schedule the pickup with the company so that he can be assured that his trash will be picked up.	High	Sprint 8	TO DO
SQD 74	As a mechanic, Simon wants to create his own account(User Profile) on Squander so that he can save his personal information like address, phone number, etc into the app for later use.	High	Sprint 7	TO DO
SQD 75	Redesign the UI/UX	Low	Sprint 7	TO DO
SQD 76	As a retiree, David wants to know his recycling statistics so that he knows how much he has contribution to saving the world from global warming	High	Sprint 8	TO DO
SQD 80	Optimize Squander Code	Medium	Sprint 8	TO DO

SPRINT BACKLOG

SPRINT 6 (09/29 - 11/2)

KEY	SUMMARY	PRIORITY	STATUS
SQD 61	Improving the model accuracy	Medium	DONE
SQD 64	As a retiree, David wants to Automatically load locations so that he can have a better user experience and easy to use application.	High	DONE
SQD 67	As an engineer, John wants to view multiple recycling locations so that he can choose to navigate to one most accessible	HIgh	DONE
SQD 74	As a mechanic, Simon wants to support a map view so that he can plan his route more intuitively	High	DONE
SQD 85	Update GitHub and Wiki Page	Medium	DONE
SQD 86	Update Technical Paper	Medium	DONE
SQD 87	Create Deliverable 6 Presentation	Medium	DONE
SQD 88	Create Deliverable 6 Pre-Recorded Video and Edit	Low	DONE
SQD 89	Update Installation Manual and User Manual	Low	DONE
SQD 91	Test Cases for Sprint 6	Low	DONE
SQD 65	As a homeowner, Mark wants to view details of the recycling location so that he can have a conversation with the company with any queries and know all the details of the working hour	High	In - Progress

USER STORIES & ACCEPTANCE CRITERIA

ID	AS A	I WANT TO	SO THAT	ACCEPTANCE CRITERIA
SQ 67	John, the engineer	View multiple recycling locations	I could choose to navigate to one most accessible	Given: John uploads image of the garbage or recyclables. When: John needs to find multiple recycling locations, Then: John is presented with multiple location, if available.
SQ 74	Simon, the mechanic	Support a map view	I could plan my route more intuitively.	Given: Simon uploads image of the garbage or recyclables, When: He needs to view the recyclable locations, Then: Simon can choose map view
SQ 64	David, the retiree	Automatically load locations	I have a better user experience and easy to use app.	Given: David be automatically redirected to recycling location, When: He they upload the image. Then: It's easier for him to see all the nearby locations
SQ 65	Mark, the homeowner	View details of the recycling location	I could have a conversation with the location and form relations.	Given: Mark has uploaded the image, When: He click on the Location, Then: Mark can have basic details of the company like address, working hours, etc.

TEST CASES

TEST CASES

Test Case Name	User Story	Test Case ID	Test Action	Expected Results	Test Result	Pass/Fail
Recycling Location	SQD-67	SQD-92	Locate the Recycle Location Link	Users should be able to see the Recycle Location link and it should be clickable	Once the user is on the About Us Screen, the recycle location link is visible, and once clicked on the button it redirects to the recycle location	PASS
		SQD-93	Locate Recycle Button	Choose the image to upload and then there comes the recycle button which is clickable	Once the user is on the result screen, recycle button is clickable	PASS
		SQD-94	Nearby Recycling Location List	User should be able to see a list of recycling location in the screen	Once the user click on the Recycle button, users can see a list if nearby recycling Location	PASS
		SQD-95	Locate the Back Button	User should be able to see the Back Button in the result screen	Once the user is on the Result Screen, the back button is visible, and once clicked on the button it redirects to the home screen	PASS
Map View	SQD-74	SQD-96	Google Map is visible	User should be able to see all the recycling location pinned on the Google Map integrated	Once user click on the list of recycling location list, all the recycling companies are pinned into the Google Map in the App	PASS
		SQD-97	Details of Pinned location	User when clicked on the pinned location in the Map show the recycling company name and details	Once user hover over the pinned location in the map, it shows user the recycling company name with its location	PASS
		SQD-98	Distance from your location	User should be able to see the distance from his home to recycling location	Once user click on any recycling location it shows the distance between the user location to the recycling location.i	PASS

STORIES COMPLETED

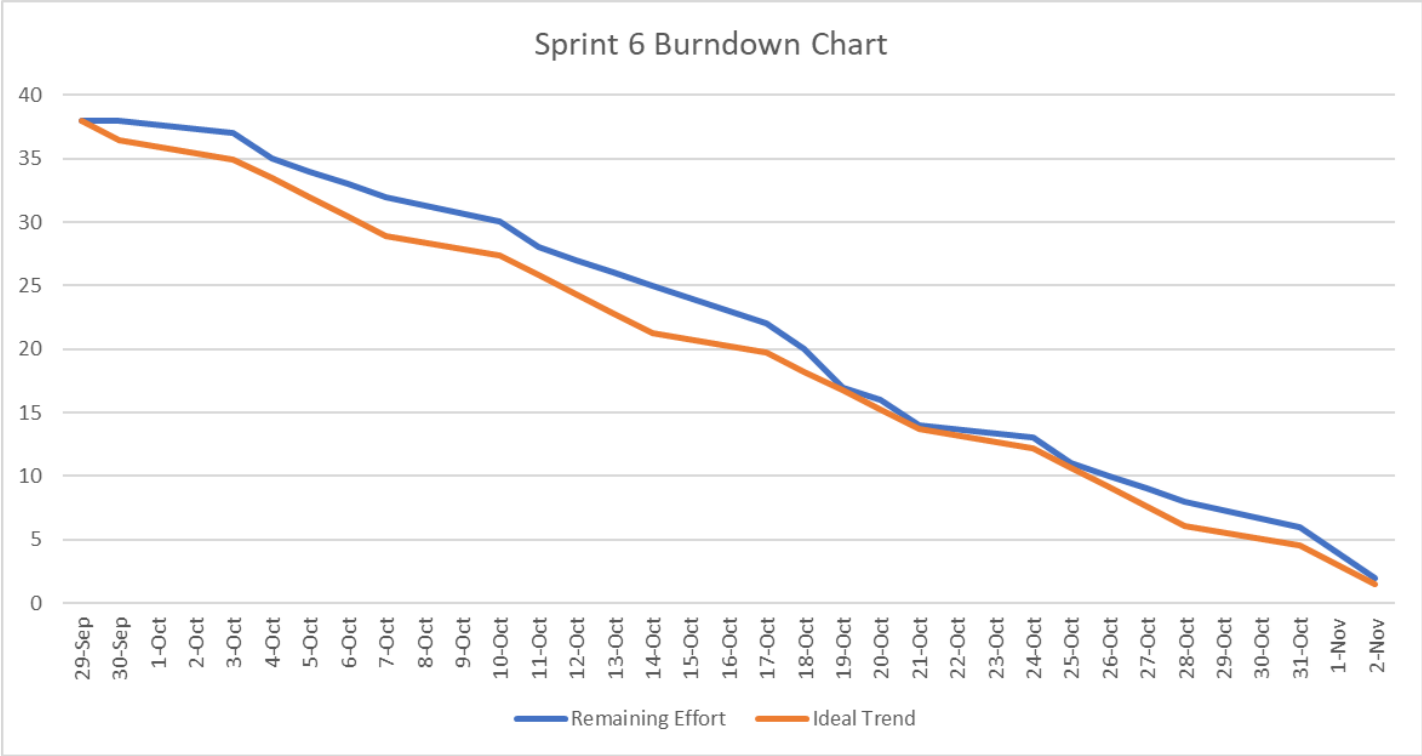
ID	AS A	I WANT TO	SO THAT	ACCEPTANCE CRITERIA
SQ 67	John, the engineer	View multiple recycling locations	I could choose to navigate to one most accessible	Given: John is provided with multiple recycling location, to choose, When: He choose to garbage a type of waste, Then: John can select any one location to garbage.
SQ 74	Simon, the mechanic	Support a map view	I could plan my route more intuitively.	Given: Simon is able to view the location on a Google Map view, When: He click on the view on map button, Then: simon can choose the route accordingly.
SQ 64	David, the retiree	Automatically load locations	I have a better user experience and easy to use app.	Given: David be automatically redirected to recycling location, When: He they upload the image. Then: It's easier for him to see all the nearby locations

STORIES NOT COMPLETED

ID	AS A	I WANT TO	SO THAT	ACCEPTANCE CRITERIA
SQ 65	Mark, the homeowner	View details of the recycling location	I could have a conversation with the location and form relations.	Given: Mark is able to view basic details of recycling location, When: He click on the Location, Then: He can have all the details of the company like address, working hours, etc.

This is an In-Progress User Story which is spilled into Sprint 7

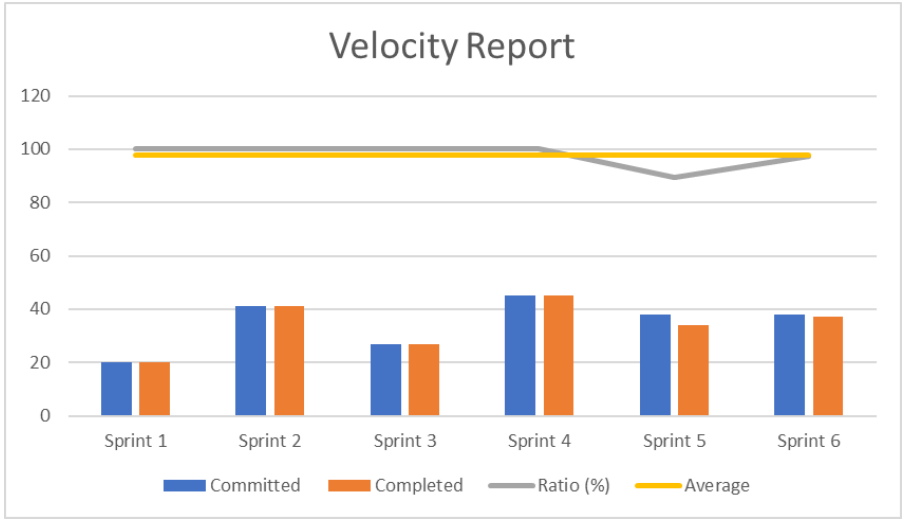
BURNDOWN CHART



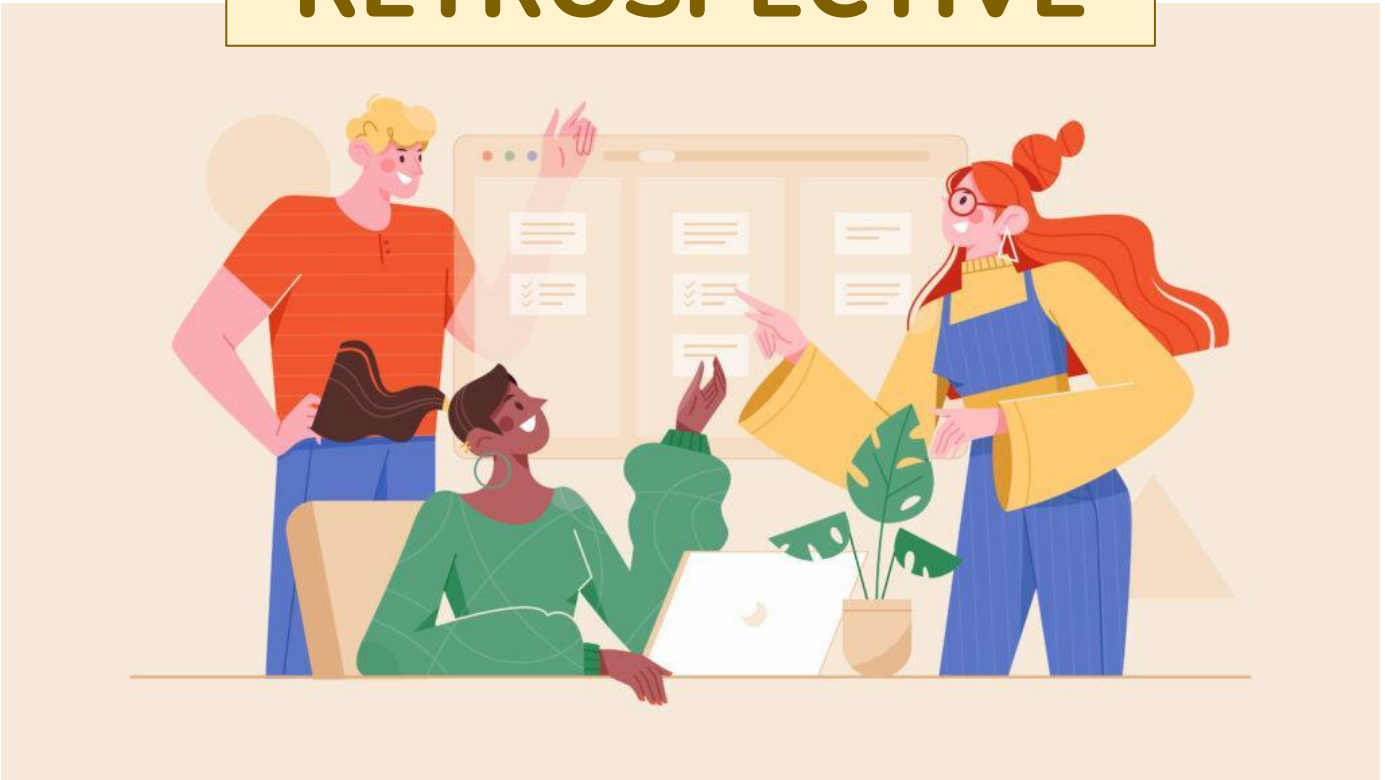
COMMITTED/COMPLETED RATIO

SPRINT	Committed	Completed	Ratio (%)	Average
Sprint 1	20	20	100	97.80701754
Sprint 2	41	41	100	
Sprint 3	27	27	100	
Sprint 4	45	45	100	
Sprint 5	38	34	89.47368421	
Sprint 6	38	37	97.36842105	

Current Committed Completed Ratio (Sprint 6) = 97.4%



RETROSPECTIVE



RETROSPECTIVE

01 What went well

- Improvements from feedbacks and continuous delivery
- Adaption blockers went well.

02 What needs improvement

- Estimation on Sprint capacity
- Regular Sprint Meetings

03 Future Actions

- Revisit Capacity estimation
- Adjust with schedule and find common time

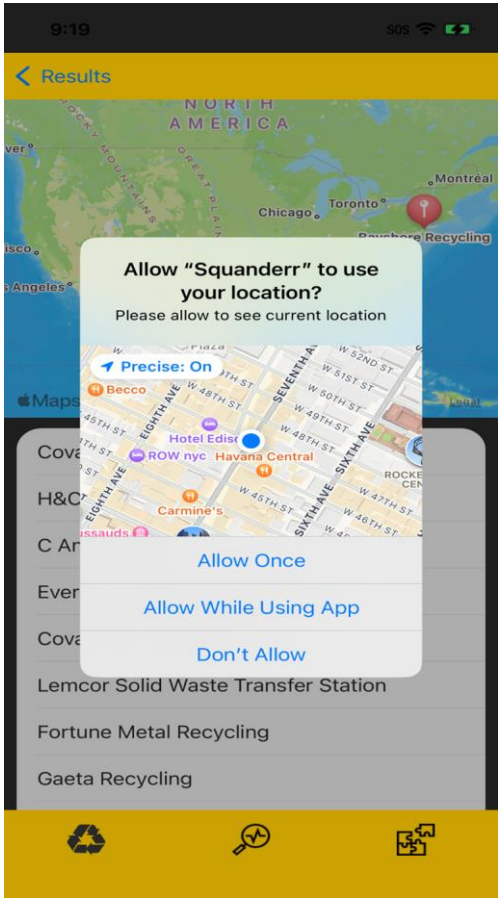
FUTURE SPRINT

SPRINT 7(NEXT SPRINT)

SPRINT 7 (11/3 - 11/16)

KEY	SUMMARY	PRIORITY	STATUS
SQD 65	As a homeowner, Mark wants to view details of the recycling location so that he can have a conversation with the company with any queries and know all the details of the working hour	High	TO DO
SQD 68	Work on UI/UX and add more feature on Navigation Bar	Medium	TO DO
SQD 72	As a homeowner, Mark wants to know about the Frequently Ask Question screen so that he can get answers to some of the commonly ask question.	High	TO DO
SQD 74	As a mechanic, Simon wants to create his own account(User Profile) on Squander so that he can save his personal information like address, phone number, etc into the app for later use.	High	TO DO
SQD 75	Redesign the UI/UX	Low	TO DO
SQD 79	Design Squander to be User Friendly	Medium	TO DO

PROJECT DEMO



APP SCREENSHOTS

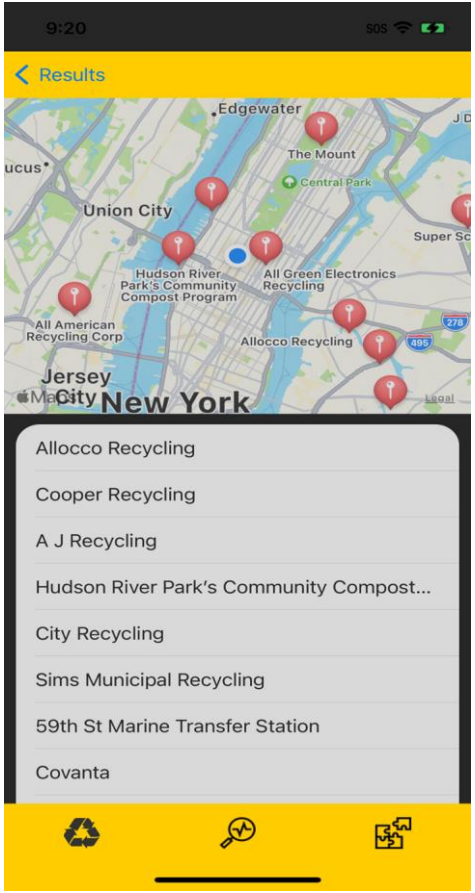
Recycling location screen..

- Permission to Access User Location

Continue..

Recycling location screen..

- Showing current Location.
- Nearby recycling location.
- And list of recycling Company.



API

MapKit API

Core Location API

GITHUB LINK

GitHub: - https://github.com/anku518/Squander/wiki