

UpWaste – Waste Resale Platform

A PROJECT REPORT

Submitted by

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BACHELOR OF TECHNOLOGY
in
COMPUTER SCIENCE ENGINEERING
with specialization in **ARTIFICIAL INTELLIGENCE**
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**DEPARTMENT OF COMPUTATIONAL
INTELLIGENCE COLLEGE OF ENGINEERING
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ABSTRACT

In the face of rising environmental challenges and inefficient waste disposal practices, **UpWaste** emerges as a digital solution to bridge the gap between waste generators and recyclers. UpWaste is a full-stack web platform that empowers individuals, households, and small businesses (sellers) to list recyclable waste, and allows registered recyclers or buyers to browse, filter, and schedule pickups based on quantity and pricing. The platform introduces role-based access for Sellers, Buyers, and Admins, providing each user with a custom dashboard for managing their operations. Buyers can view listings by material type or location, schedule pickups, and track previous orders. Sellers can manage their uploaded listings, track pickup status, and view earnings. Admins monitor the entire system, with the ability to manage users, pickups, waste listings, and platform-wide analytics. UpWaste is developed using the **MERN stack**—MongoDB, Express.js, React.js, and Node.js—and adheres to modern UI/UX standards with support for animations, responsive design, and dark mode. It also implements **JWT-based authentication, dynamic routing, role validation**, and a central database that supports real-time operations. Aligned with the **United Nations Sustainable Development Goal (SDG) 12: Responsible Consumption and Production**, UpWaste promotes a circular economy and environmentally conscious behavior. It brings transparency and traceability to waste management by enabling structured digital reuse. The system creates impact by minimizing landfill waste, enabling economic incentives for recycling, and building a community-oriented ecosystem for sustainable development. This report details the planning, development, sprint execution, testing, architecture, and outcomes of the project. UpWaste not only provides a technical solution but also envisions a cleaner, more connected, and eco-responsible future.

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ABBREVIATIONS

Abbreviation	Full Form
API	Application Programming Interface
AI	Artificial Intelligence
PWA	Progressive Web Application
ML	Machine Learning
OCR	Optical Character Recognition
JWT	JSON Web Token
UI	User Interface
UX	User Experience
CRUD	Create, Read, Update, Delete
GPS	Global Positioning System
DB	Database
S3	Amazon Simple Storage Service
PWA	Progressive Web App
CO₂	Carbon Dioxide
SOP	Standard Operating Procedure
CSV	Comma Separated Values
TS	TypeScript (<i>if used in future versions</i>)
UpWaste	Smart Waste Resale Platform (Project Name)
UI/UX	User Interface / User Experience
SQS	Simple Queue Service (AWS)
IP	Internet Protocol
SSL	Secure Sockets Layer

MERN	MongoDB, Express.js, React.js, Node.js (Tech Stack)
CRUD Ops	CRUD Operations
CI/CD	Continuous Integration / Continuous Deployment
HTTP	Hypertext Transfer Protocol

CHAPTER 1

INTRODUCTION

1.1 Introduction to UpWaste – Waste Resale Platform :

UpWaste is a comprehensive web-based platform designed to facilitate the resale, pickup, and responsible disposal of recyclable waste. In today's rapidly urbanizing world, waste generation has increased manifold, but the systems to handle this waste effectively—especially recyclable materials—have not scaled proportionally. UpWaste addresses this challenge by introducing a transparent, digital bridge between waste generators and recycling buyers.

The platform enables **waste sellers** (individuals, households, small businesses, or institutions) to list various types of recyclable waste—such as plastic, paper, glass, metal, or e-waste—along with associated metadata like weight, category, location, and asking price. On the other end, **registered recyclers or buyers** can log in to browse these listings, filter by relevance, view detailed descriptions, and schedule pickups by specifying the required quantity.

What makes UpWaste stand out is its **role-based functionality**:

- **Sellers** can manage their listings, see completed pickups, and track earnings.
- **Buyers** can filter listings, add items to cart, request pickups, and view total money spent.
- **Admins** have access to a dedicated dashboard to monitor the platform's activity, manage users, oversee all listings and pickups, and visualize data via real-time charts and stats.

Developed using the **MERN stack** (MongoDB, Express.js, React.js, and Node.js), the platform supports full-stack operations with modern frontend responsiveness and a secure backend. It employs **JWT-based authentication**, **localStorage session tracking**, and **protected routes** to ensure data safety and user-specific access.

The main objective of UpWaste is to encourage structured recycling and reuse, helping transform the traditional linear waste economy into a circular one. Its support for dynamic user dashboards, admin analytics, scheduled pickups, and completed tracking transforms it from just a waste listing site into a **comprehensive smart waste management ecosystem**.

1.2 Motivation

The global waste management crisis has become one of the most pressing environmental concerns of the 21st century. In countries like India, more than **62 million tonnes** of waste are generated annually, of which a significant portion is recyclable. Yet due to the absence of structured systems, **only a fraction** of this waste is actually recycled. Most recyclable waste ends up in landfills or is incinerated, causing air, water, and land pollution.

The **core motivation** behind **UpWaste** stems from this mismatch between **potential and reality**. On one side, there are countless households, hostels, offices, and local vendors who regularly generate recyclable materials. On the other side, there are recyclers and buyers looking for these very materials in bulk and at scale. However, due to the lack of a common, transparent, and accessible platform, these two ends rarely meet efficiently.

Through first-hand observation of waste being dumped in college hostels, market areas, and apartment societies, it became evident that most people have **no idea how or where to sell recyclable waste**. Even if they do, they often lack access to buyers or don't have the time to explore the informal networks of scrap collectors. This inspired the creation of a platform that would make **responsible waste disposal as easy as ordering a product online**.

UpWaste is more than just a marketplace; it is a response to the need for:

- **Empowering individuals and businesses** to take control of how their waste is handled.

- **Digitizing the informal sector** and making it more transparent, structured, and inclusive.
- **Bringing traceability and accountability** to every unit of recyclable material sold or picked up.
- **Creating an ecosystem** where sustainability is incentivized, not just idealized.

Furthermore, with increasing adoption of smartphones, access to the internet, and a growing awareness of sustainability among younger generations, the time is right for a solution like UpWaste. By offering a **tech-driven, user-friendly, and scalable** waste resale platform, UpWaste motivates people to treat waste as a **resource**, not a burden.

1.3 Sustainable Development Goal of the Project

The **UpWaste** platform is deeply aligned with the principles outlined in the **United Nations Sustainable Development Goals (SDGs)**, particularly with **SDG 12: Responsible Consumption and Production**. This SDG emphasizes the need for systemic change in the way societies produce and consume resources, focusing on efficiency, sustainability, and the reduction of waste at its source. UpWaste addresses these issues by creating a digital infrastructure that facilitates the resale and responsible disposal of recyclable materials, thereby promoting a circular economy.

One of the key ways in which UpWaste contributes to SDG 12 is by reducing the volume of waste that ends up in landfills. In traditional systems, even recyclable materials are often discarded due to a lack of awareness or access to resale networks. UpWaste enables sellers to list these materials for others to collect and reuse, thereby minimizing waste generation. This

listing mechanism encourages both individuals and businesses to rethink how they manage their waste, offering them not just an environmental incentive but also a financial one.

Furthermore, the platform supports digital traceability by logging all transactions, pickups, and listings in a secure database. This not only enhances accountability but also allows users to reflect on their own environmental impact. The transparency embedded in the system empowers users to make informed decisions and contributes to broader waste reduction targets.

Although SDG 12 is the core objective, UpWaste also advances other related SDGs. It supports **SDG 11: Sustainable Cities and Communities** by lowering the urban waste burden and encouraging community-level participation in recycling efforts. It contributes to **SDG 8: Decent Work and Economic Growth** by providing economic opportunities to micro-recyclers, scrap vendors, and local collectors. Additionally, it has implications for **SDG 13: Climate Action** by discouraging waste burning and unnecessary transportation, thus helping reduce carbon emissions.

By enabling role-based participation, facilitating measurable environmental impact, and encouraging socially responsible behavior, UpWaste is not only a solution to local inefficiencies but a meaningful contributor to global sustainability targets. Through its digital-first, user-centric approach, the platform transforms waste management from a fragmented task into an organized, goal-oriented, and collaborative process.

1.4 Product Vision Statement

1.4.1 Audience

Primary Audience:

- **Waste Generators (Sellers):** Individuals, households, small businesses, and local vendors who regularly produce recyclable waste such as paper, plastic, metals, e-

waste, or glass. These users seek a simple and transparent platform to monetize their waste responsibly.

Secondary Audience:

- **Recyclers (Buyers):** Authorized recycling agents, companies, or institutions looking to collect, process, and reuse recyclable materials from verified sources.
- **Administrative Authorities:** Platform moderators and environmental officers interested in monitoring overall activity, maintaining platform integrity, and ensuring compliance with sustainability goals.

1.4.2 Needs

Primary Needs:

- A **user-friendly interface** for posting waste listings with details like category, weight, pricing, and images.
- **Filtering and discovery tools** for buyers to quickly locate relevant waste based on location and material type.
- **Scheduling systems** for buyers to request and track pickups based on required quantity and estimated price.
- **Dashboards** for users to track money earned (for sellers) and money spent (for buyers), along with pickup status.

Secondary Needs:

- **Authentication and authorization mechanisms** to ensure secure access and role-based functionality.
- **Admin tools** to manage and moderate users, listings, and pickup operations.

- **Data visualization components** for revenue, waste recovered, and usage statistics.
- **Environmental impact metrics** for reporting on landfill diversion and sustainable reuse.

1.4.3 Products

Core Product:

- A **role-based waste resale platform** developed using the MERN stack, featuring dynamic listings, dashboards for sellers and buyers, scheduled pickup management, and admin control tools.

Additional Features:

- **Admin Dashboard** with real-time data on users, waste listings, revenue, and system performance.
- **Search and filter utilities** based on category, location, and listing weight.
- **Completed pickup tracking**, status toggles, and calculation of earnings/spending.
- **Authentication with JWT tokens** for secure user login and session management.
- **Dark mode, animations, and UI enhancements** to improve usability.

1.4.4 Values

Core Values:

- **Transparency:** Making the waste resale process clear, trackable, and verifiable for all participants.

- **Sustainability:** Enabling communities to participate in environmental preservation through a structured digital platform.
- **Empowerment:** Giving individuals and small businesses the tools to convert waste into value.

Differentiators:

- **Real-time role-based dashboards** customized for sellers, buyers, and administrators.
- **Dynamic pickup scheduling system** with cost estimations based on waste weight and unit pricing.
- **Environmental and economic impact visualization**, showing users the real-world benefit of their activities.
- **Full MERN stack implementation**, enabling seamless real-time interaction and scalable infrastructure.

1.5 Product Goal

The primary objective of **UpWaste** is to transform the way recyclable waste is managed, monetized, and redistributed in urban and semi-urban environments. The project aims to build a centralized yet flexible platform that empowers users to participate in a circular economy by bridging the disconnect between waste generators and recycling stakeholders.

The overarching product goal is to **digitize, democratize, and decentralize waste resale operations** through a role-specific, data-driven application architecture.

Key Goals of the Product:

1. Enable Dynamic Waste Listing by Sellers

Sellers, such as households, small vendors, or institutions, should be able to post listings for recyclable waste in real time. Each listing includes title, description, category (e.g., plastic, glass, paper), image, weight, location, and proposed price. The interface must be intuitive and accessible on all devices.

2. Allow Recyclers to Discover and Schedule Pickups

Buyers (recyclers) must have the ability to browse all available waste listings, apply filters (by category, location, weight, etc.), and schedule pickups with their desired quantity. Each scheduled pickup should be logged and visible in their dashboard for tracking.

3. Implement Role-Based Dashboards

The application should provide distinct dashboards for each user role:

- **Sellers** can manage their listings, track sales, and see earnings.
- **Buyers** can view listings, request pickups, track requests, and monitor money spent.

- **Admins** can manage users, waste data, pickups, and view platform-wide analytics.

4. Track Pickup Status and Transaction History

Once a pickup is requested, its status should be tracked from initiation to completion. Sellers should be able to view which items were sold and their total income, while buyers should track which pickups were fulfilled and how much they've spent.

5. Maintain System Integrity via Admin Panel

Admins should be able to moderate users, delete or approve listings, monitor overall waste movement, and access visual reports that highlight total pickups, user growth, completed orders, and estimated revenue.

6. Deliver a Responsive and Accessible User Experience

The product must offer modern UI/UX, including:

- Light/Dark mode toggle.
- Responsive design for desktop and mobile.
- Toast notifications, loading animations, and intuitive controls.

7. Integrate with a Secure Backend Infrastructure

All operations should be securely handled via a Node.js and Express backend, connected to a MongoDB Atlas database. JWT-based authentication ensures that users can only access their permitted routes and data.

1.6 Product Backlog

S.No	Feature	User Story
US1	User Registration/Login	As a new user, I want to register and log in based on my role (Generator or Recycler) so that I can access role-specific features securely and manage my waste-related activity.
US2	Waste Upload (Generator)	As a generator, I want to upload waste listings with title, image, weight, category, price, and location so that buyers can view and purchase my recyclable materials.
US3	Schedule Pickup (Recycler)	As a recycler, I want to browse listings and request pickups by specifying quantity so that I can collect waste relevant to my needs and track my requests.
US4	Mark Pickup Completed	As a recycler, I want to mark a pickup as completed once it's done so that the seller can be notified, and the system can update stats and listing quantity accordingly.
US5	View Orders & Stats (Buyer)	As a buyer, I want to see my total money spent, past pickups, and current requests so that I can evaluate my recycling contribution and manage pickups efficiently.
US6	Admin Dashboard	As an admin, I want to monitor all users, listings, pickups, and see real-time analytics so that I can manage the platform effectively and ensure sustainability targets.
US7	Public Listings	As a public user, I want to browse listings without logging in so that I can get an idea of available waste and decide whether to register as a recycler.
US8	Real-Time Image Capture	As a generator, I want to capture and upload a real-time photo of my waste using a camera so that buyers can see its condition before deciding to pick it up.
US9	GPS & Distance Calculator	As a buyer, I want to see how far a waste listing is from my location so that I can plan pickups efficiently and reduce transport time and cost.
US10	Payment Details	As a buyer, I want to view payment estimation and possibly pay online in future so that I can complete the waste transaction digitally.
US11	Generator Verification	As an admin, I want to verify generators by checking identity details so that I can ensure trustworthiness and improve listing credibility on the platform.

Table 1.1 Product Backlog for UpWaste

The product backlog of UpWaste : waste resale platform was configured using the MS planner Agile Board which is represented in the following Table 1.1. The Product Backlog consists of the complete user stories of UpWaste : waste resale platform.

Each user story consist of necessary parameters like MoSCoW prioritization, Functional and non functional parameters, detailed acceptance criteria with linked tasks.

The screenshot shows the Microsoft Planner interface for the 'UpWaste' project. The board is divided into five columns: Product Backlog, Sprint Backlog, Completed Items, Awaiting Review, and Add a new bucket. The 'Completed Items' column is highlighted, showing a list of completed tasks. Each task card includes a title, due date, and a status indicator (green circle with 'SS'). Some cards also show a progress bar and a completion message like 'Completed by SIDDHANT SHAR...'. The 'Completed Items' column has a total count of 6 tasks.

Figure 1.1 MS Planner Board of UpWaste : waste resale platform

Above Figure 1.1 consists of the user story completed using MS Planner Board of UpWaste : waste resale platform.

1.7 Product Release Plan

The following Figure 1.2 depicts the release plan of the project

Release Plan								
Features	Month 1				Month 2			
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Project Setup & Infrastructure	Repo, backend, DB setup							
User Authentication & Role Management		Auth system, RBAC, login/signup UI						
Waste Listing System			Waste CRUD, dashboard, filters					
Buyer-Seller Interaction				Inquiry, messaging, alerts				
Admin Panel & Monitoring			Admin, moderation, management					
Testing & Optimization						Testing, optimization, security		
UI/UX Enhancement & Final Adjustments							UI/UX, mobile support	
Deployment & Final Review					Deployment, documentation, live demo setup			

Figure 1.2 Release plan of UpWaste : Waste Resale Platform

CHAPTER 2

SPRINT PLANNING AND EXECUTION

2.1 Sprint 1

2.1.1 Sprint Goal with User Stories of Sprint 1

The goal of Sprint 1 is to implement the core functionality for user registration, login, and role-based dashboard access. Sellers can post waste listings with key details like title, category, weight, and price. Buyers can browse active listings and request pickups by entering quantity. This sprint establishes the core flow between seller and buyer roles.

The following table 2.1 represents the detailed user stories of the sprint 1.

S.No	Feature	User Story
US1	User Registration/Login	As a new user, I want to register and log in based on my role (Generator or Recycler) so that I can access role-specific features securely and manage my waste-related activity.
US2	Waste Upload (Generator)	As a generator, I want to upload waste listings with title, image, weight, category, price, and location so that buyers can view and purchase my recyclable materials.
US3	Schedule Pickup (Recycler)	As a recycler, I want to browse listings and request pickups by specifying quantity so that I can collect waste relevant to my needs and track my requests.

Table 2.1 Detailed User Stories of sprint 1

Planner Board representation of user stories are mentioned below figures 2.1,2.2 and 2.3

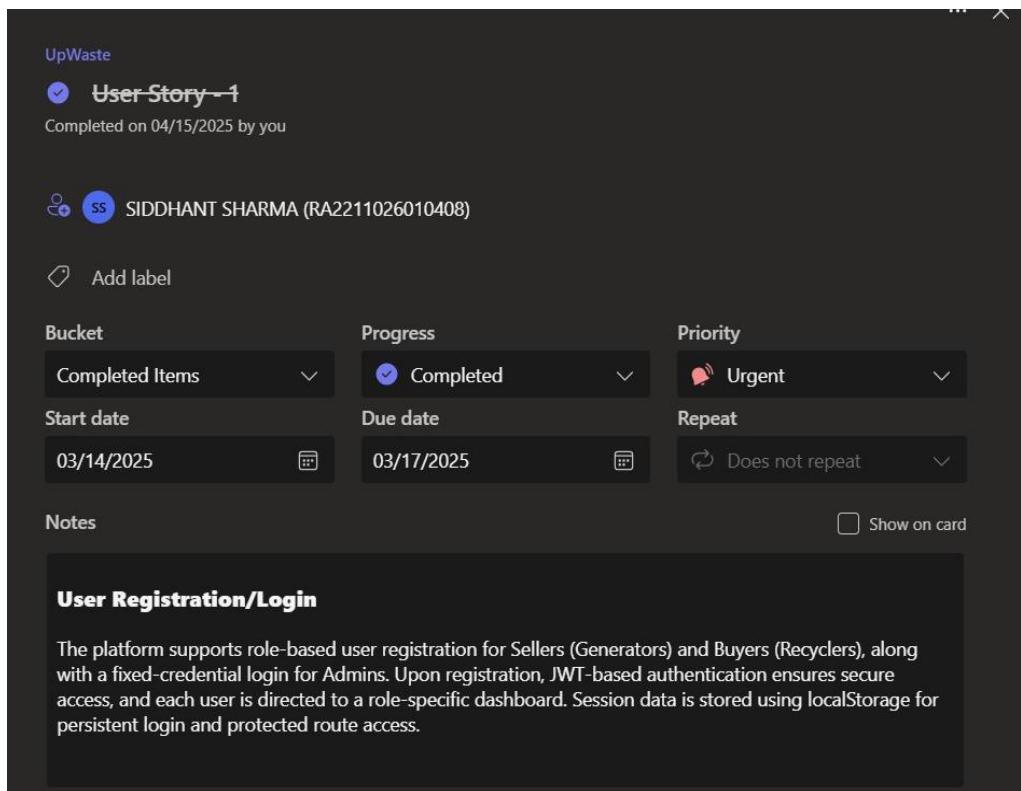


Figure 2.1 user story for user registration

The above Figure 2.1 displays the User Story 1 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

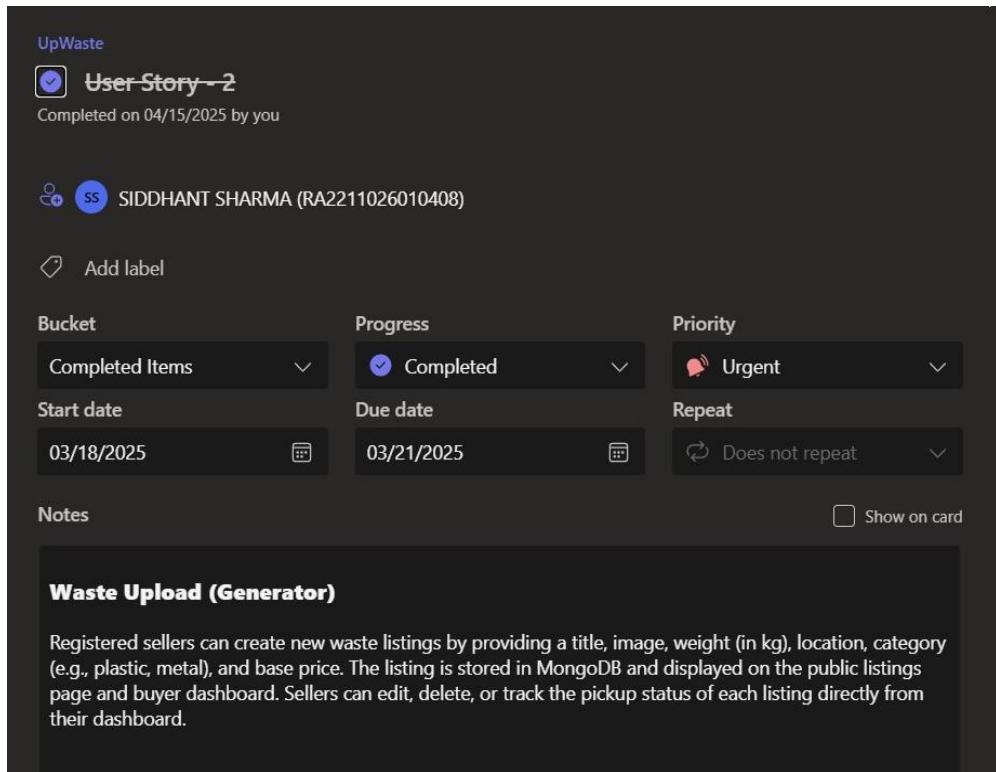


Figure 2.2 user story for waste upload

The above Figure 2.2 displays the User Story 2 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

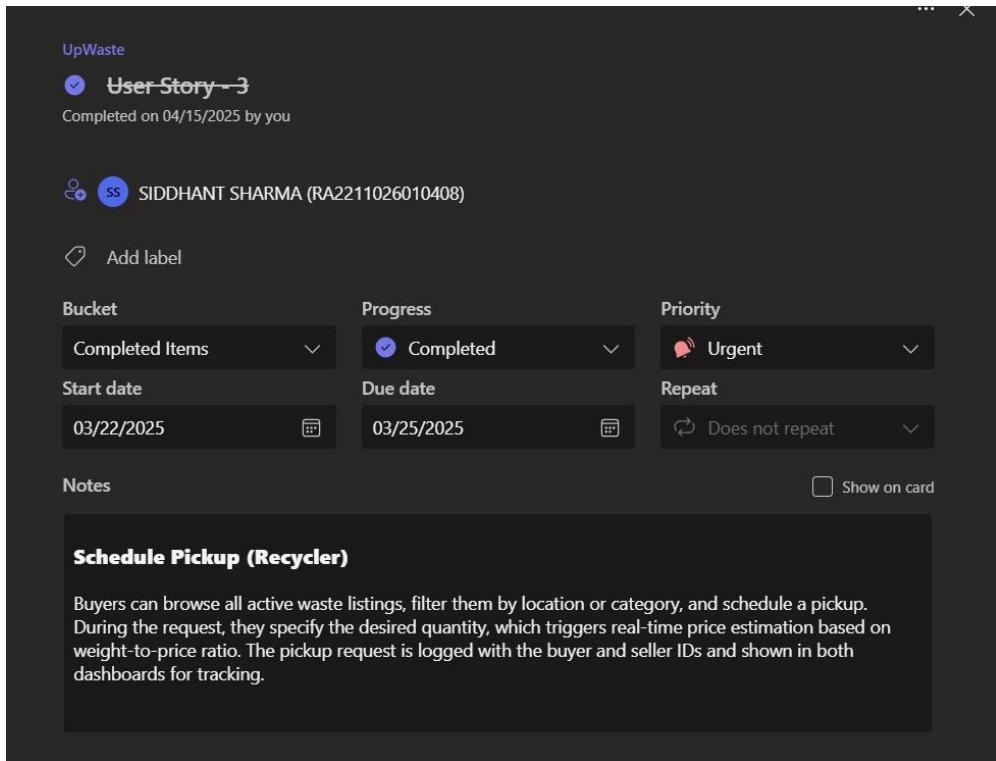


Figure 2.3 User story for schedule pickup

The above Figure 2.3 displays the User Story 3 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

2.1.2 Functional Test Cases

Feature	Test Case	Steps to Execute Test Case	Expected Output	Actual Output	Status
US1: User Registration & Login	TC_01: Register New User	1. Open UpWaste app 2. Click on "Register" 3. Fill name, email, password, select role 4. Click "Register"	User account is successfully created and redirected to respective dashboard	User account created and redirected	<input checked="" type="checkbox"/> Pass
	TC_02: Login Existing User	1. Click "Login" 2. Enter registered email & password 3. Click "Login"	User is successfully logged in and redirected	Login successful and dashboard visible	<input checked="" type="checkbox"/> Pass
US2: Waste Upload (Generator)	TC_03: Post New Listing	1. Login as Generator 2. Go to "Post Waste" 3. Enter title, weight, category, image, location 4. Click "Submit"	New listing is created and shown in both dashboards	Listing posted and visible	<input checked="" type="checkbox"/> Pass
	TC_04: Edit/Delete Listing	1. Go to "My Listings" 2. Click Edit/Delete 3. Submit updated fields	Listing is updated or removed successfully	Listing updated/deleted as expected	<input checked="" type="checkbox"/> Pass
US3: Schedule Pickup (Recycler)	TC_05: Browse Listings	1. Login as Recycler 2. Browse waste feed 3. Apply filters (category/location)	Filtered results shown based on input	Listings filtered and displayed	<input checked="" type="checkbox"/> Pass
	TC_06: Request Pickup	1. Click "Request Pickup" 2. Enter quantity 3. Confirm request	Pickup is recorded and shown	Pickup scheduled and shown in dashboard	<input checked="" type="checkbox"/> Pass

Table 2.3 Detailed Functional Test Case

The above Table 2.3 Shows all the Detailed Functional Test Cases which are used in User Story 1 , User Story 2 and User Story 3.

2.1.3 Committed Vs Completed User Stories

The following Figure 2.4 Displays the Bar graph for Committed vs Completed User Stories the sprint backlog for sprint 1.



Figure 2.4 Bar graph for Committed Vs Completed User Stories

2.1.4 Sprint Retrospective

The following Figure 2.5 Displays the sprint retrospective for what went well, what went poorly , what ideas do we have and how should we take action.

Sprint Retrospective			
What went well	What went poorly	What ideas do you have	How should we take action
<p><i>This section highlights the successes and positive outcomes from the sprint. It helps the team recognize achievements and identify practices that should be continued.</i></p> <p>The role-based dashboards (buyer, seller, admin) were successfully implemented.</p>	<p><i>This section identifies the challenges, roadblocks, or failures encountered during the sprint. It helps pinpoint areas that need improvement or change.</i></p> <p>Some feature integrations (like admin stats and login redirection) required multiple fixes and debugging.</p>	<p><i>This section is for brainstorming new approaches, tools, or strategies to enhance the team's efficiency, productivity, or project outcomes.</i></p> <p>Use centralized state management for smoother redirection and authentication handling.</p>	<p><i>This section outlines specific steps or solutions to address the issues and implement the ideas discussed, ensuring continuous improvement in future sprints.</i></p> <p>Introduce Redux or Context improvements to handle global state more reliably.</p>

Figure 2.5 Sprint Retrospective for the Sprint 1

2.2 SPRINT 2

2.2.1 Sprint Goal with User Stories of Sprint 2

The goal of Sprint 2 is to enhance the waste management workflow by implementing post-pickup features and platform transparency. This sprint introduces marking pickups as completed, tracking buyer statistics, creating a public waste feed, and setting up foundational admin capabilities.

The following table 2.4 represents the detailed user stories of the sprint 2.

S.No	Feature	User Story
US4	Mark Pickup Completed	As a recycler, I want to mark a pickup as completed once it's done so that the seller can be notified, and the system can update stats and listing quantity accordingly.
US5	View Orders & Stats (Buyer)	As a buyer, I want to see my total money spent, past pickups, and current requests so that I can evaluate my recycling contribution and manage pickups efficiently.
US6	Admin Dashboard	As an admin, I want to monitor all users, listings, pickups, and see real-time analytics so that I can manage the platform effectively and ensure sustainability targets.
US7	Public Listings	As a public user, I want to browse listings without logging in so that I can get an idea of available waste and decide whether to register as a recycler.

Table 2.4 Detailed User Stories of sprint 2

Planner Board representation of user stories are mentioned below figures 2.6,2.7,2.8 and 2.9

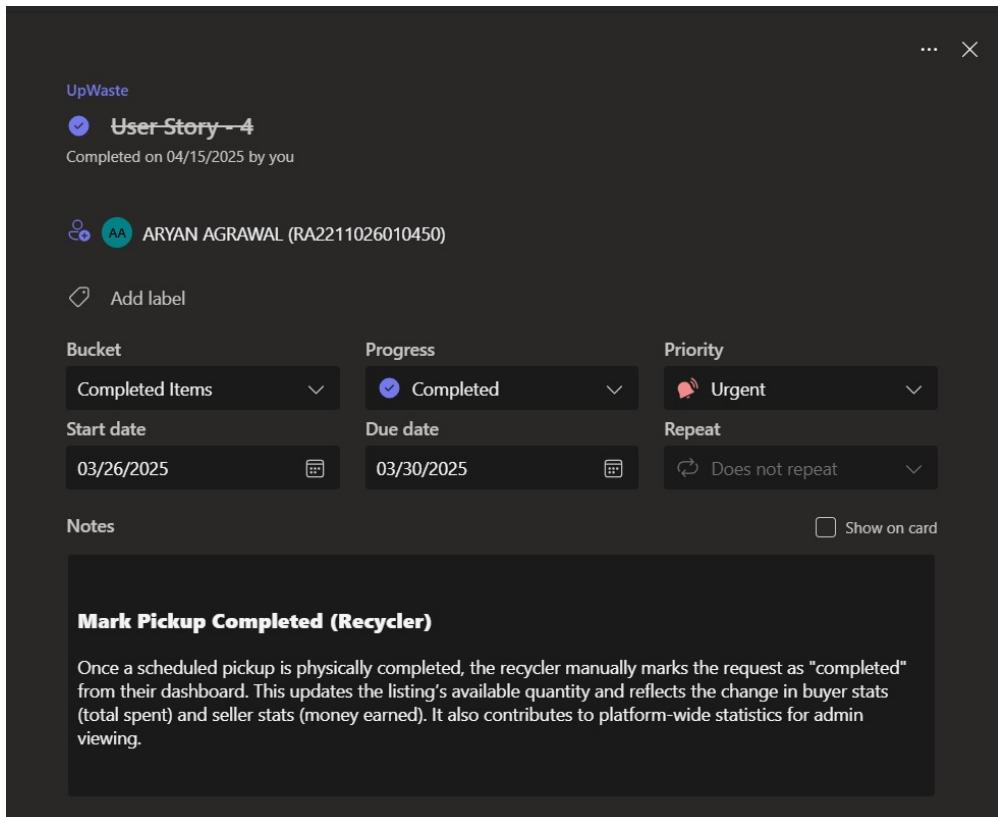


Figure 2.6 user story for mark pickup completed

The above Figure 2.6 displays the User Story 4 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

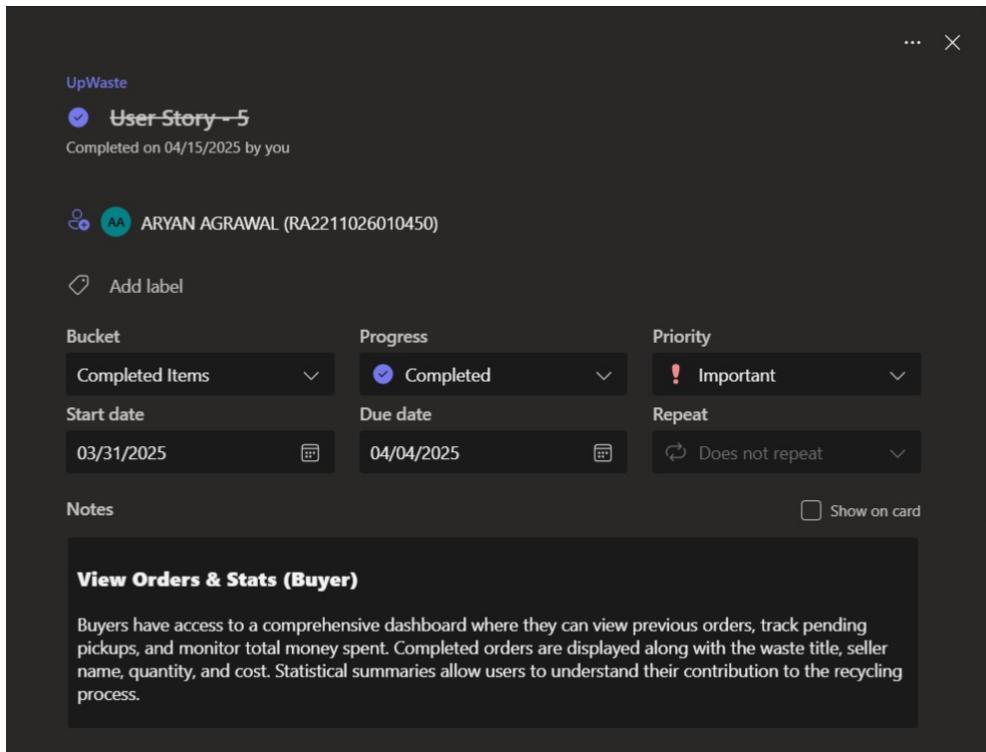


Figure 2.7 user story for view orders and stats

The above Figure 2.7 displays the User Story 5 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

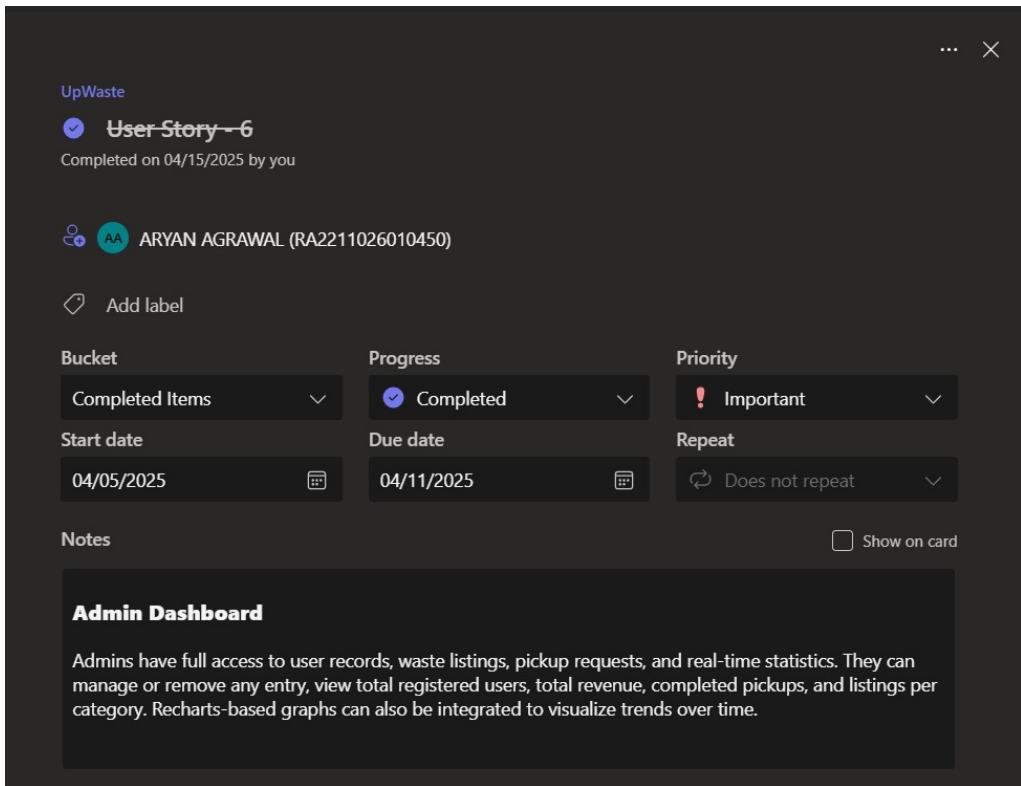


Figure 2.8 User story for admin dashboard

The above Figure 2.8 displays the User Story 6 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

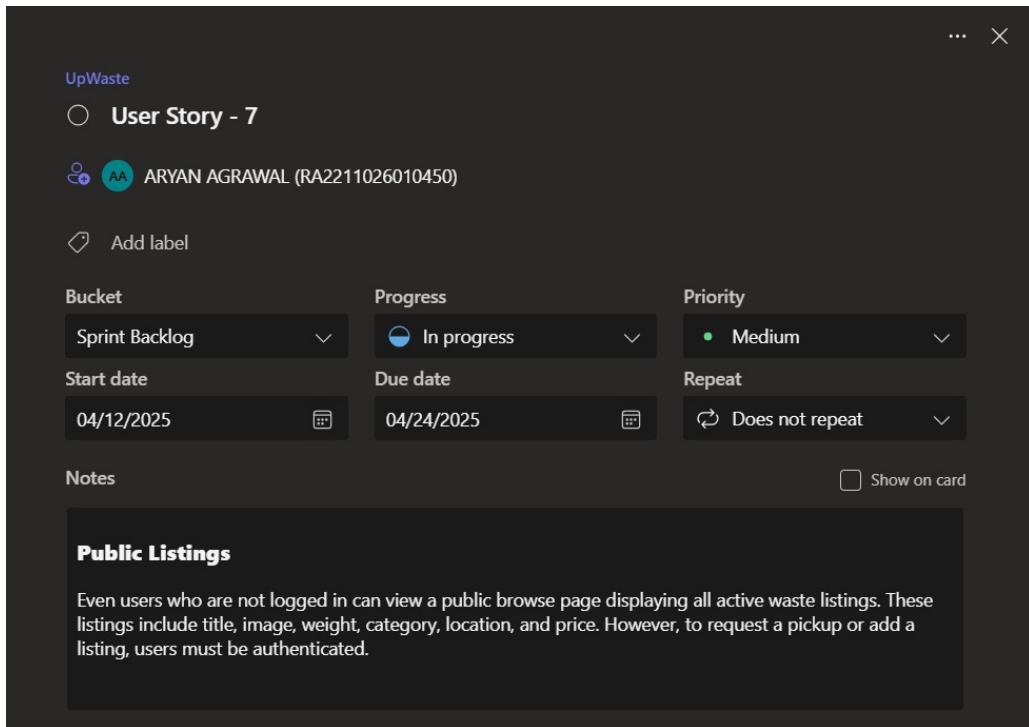


Figure 2.9 User story for public listings

The above Figure 2.9 displays the User Story 7 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

2.2.2 Functional Test Cases

Feature	Test Case	Steps to Execute Test Case	Expected Output	Actual Output	Status
US4: Mark Pickup Completed	TC_07: Mark Completed	1. Go to Scheduled Pickups (Recycler) 2. Click "Mark as Completed" on a request	Status updated to "Completed" and added to buyer stats	Status changed successfully	<input checked="" type="checkbox"/> Pass
US5: Buyer Dashboard	TC_08: View Buyer Stats	1. Login as Buyer 2. Open dashboard tab 3. Check total spent, scheduled, and completed orders	Correct statistics shown	All stats display correctly	<input checked="" type="checkbox"/> Pass
	TC_09: View Previous Orders	1. Go to "Previous Orders" 2. Browse list of completed pickups	List displays item, seller, and price	List renders as expected	<input checked="" type="checkbox"/> Pass
US6: Public Listings	TC_10: Browse Public Listings	1. Open UpWaste homepage 2. Scroll listings 3. Filter by category or location	Listings shown without login	Data visible and clickable	<input checked="" type="checkbox"/> Pass
US7: Admin Login & Dashboard	TC_11: Admin Login	1. Go to Admin Login 2. Enter fixed credentials 3. Click Login	Admin is logged in and token is stored	Dashboard loads	<input checked="" type="checkbox"/> Pass

Table 2.5 Detailed Functional Test Case

The above Table 2.5 Shows all the Detailed Functional Test Cases which are used in User Story 4 , User Story 5 , User Story 6 and User Story 7.

2.2.3 Committed Vs Completed User Stories

The following Figure 2.10 Displays the Bar graph for Committed vs Completed User Stories the sprint backlog for sprint 2.



Figure 2.10 Bar graph for Committed Vs Completed User Stories

2.2.4 Sprint Retrospective

The following Figure 2.11 Displays the sprint retrospective for what went well, what went poorly , what ideas do we have and how should we take action.

Sprint Retrospective			
What went well	What went poorly	What ideas do you have	How should we take action
<p><i>This section highlights the successes and positive outcomes from the sprint. It helps the team recognize achievements and identify practices that should be continued.</i></p>	<p><i>This section identifies the challenges, roadblocks, or failures encountered during the sprint. It helps pinpoint areas that need improvement or change.</i></p>	<p><i>This section is for brainstorming new approaches, tools, or strategies to enhance the team's efficiency, productivity, or project outcomes.</i></p>	<p><i>This section outlines specific steps or solutions to address the issues and implement the ideas discussed, ensuring continuous improvement in future sprints.</i></p>
Admin panel was integrated with user/waste/pickup management successfully.	Admin login session was not preserved properly across navigation.	Store admin tokens separately and ensure auth header is added in all API calls.	Fix axios interceptor for admin and create a dedicated AdminAuth context.
MongoDB was properly linked with full CRUD routes tested for waste and pickup flows.	Some placeholder images failed to load due to broken external links.	Add fallback images stored locally instead of relying on remote placeholder links.	Store fallback images inside /assets and use them by default in components.

Figure 2.11 Sprint Retrospective for the Sprint 2

2.3 Sprint 3

2.3.1 Sprint Goal with User Stories of Sprint 3

The goal of Sprint 3 is to enhance UpWaste's intelligence, security, and trust by integrating real-time features such as image capture, location-based filtering, payment visibility, and verification for generators.

The following table 2.6 represents the detailed user stories of the sprint 3

S.No	Feature	User Story
US8	Real-Time Image Capture	As a generator, I want to capture and upload a real-time photo of my waste using a camera so that buyers can see its condition before deciding to pick it up.
US9	GPS & Distance Calculator	As a buyer, I want to see how far a waste listing is from my location so that I can plan pickups efficiently and reduce transport time and cost.
US10	Payment Details	As a buyer, I want to view payment estimation and possibly pay online in future so that I can complete the waste transaction digitally.
US11	Generator Verification	As an admin, I want to verify generators by checking identity details so that I can ensure trustworthiness and improve listing credibility on the platform.

Table 2.6 Detailed User Stories of sprint 3

Planner Board representation of user stories are mentioned below figures 2.12, 2.13, 2.14 and 2.15

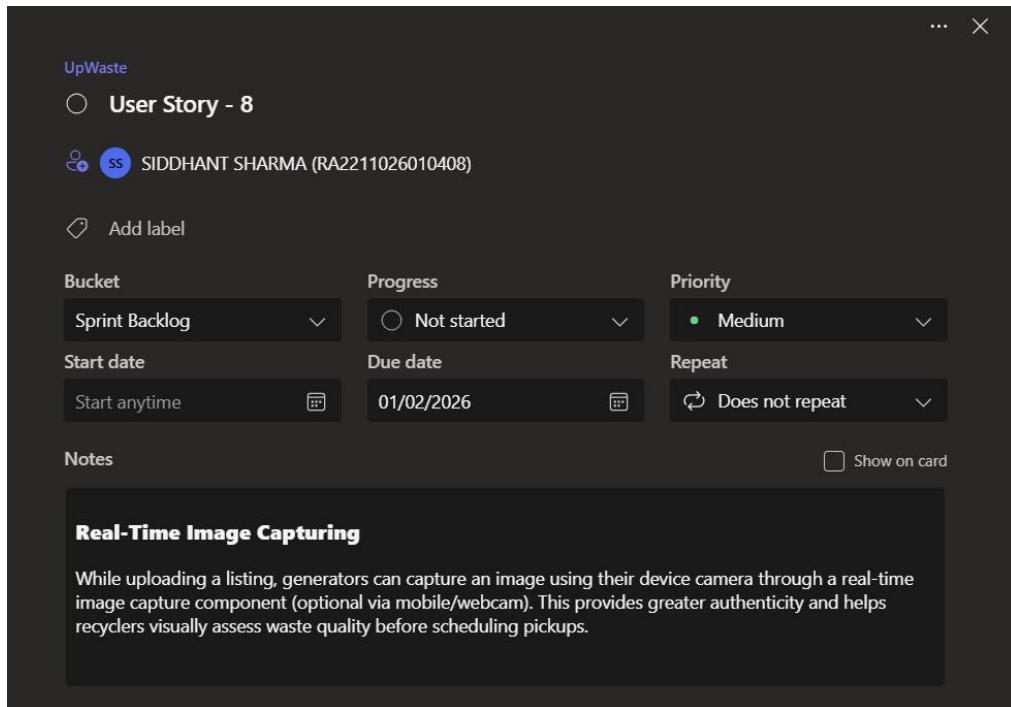


Figure 2.12 user story for real time image capturing

The above Figure 2.12 displays the User Story 8 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

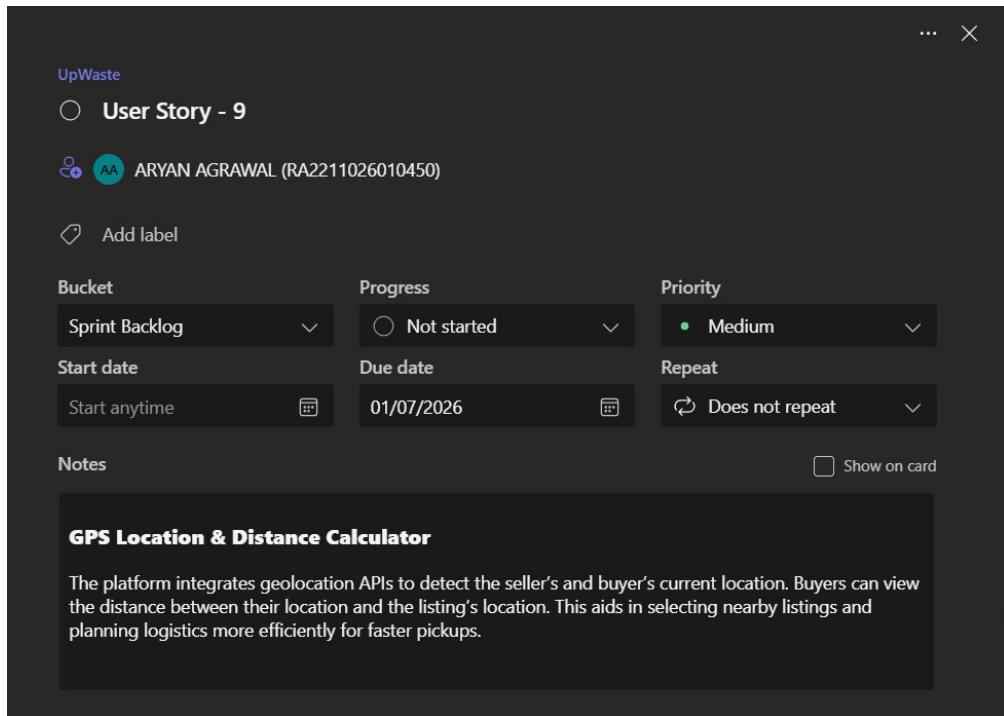


Figure 2.13 user story for GPS location and distance calculator

The above Figure 2.13 displays the User Story 8 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

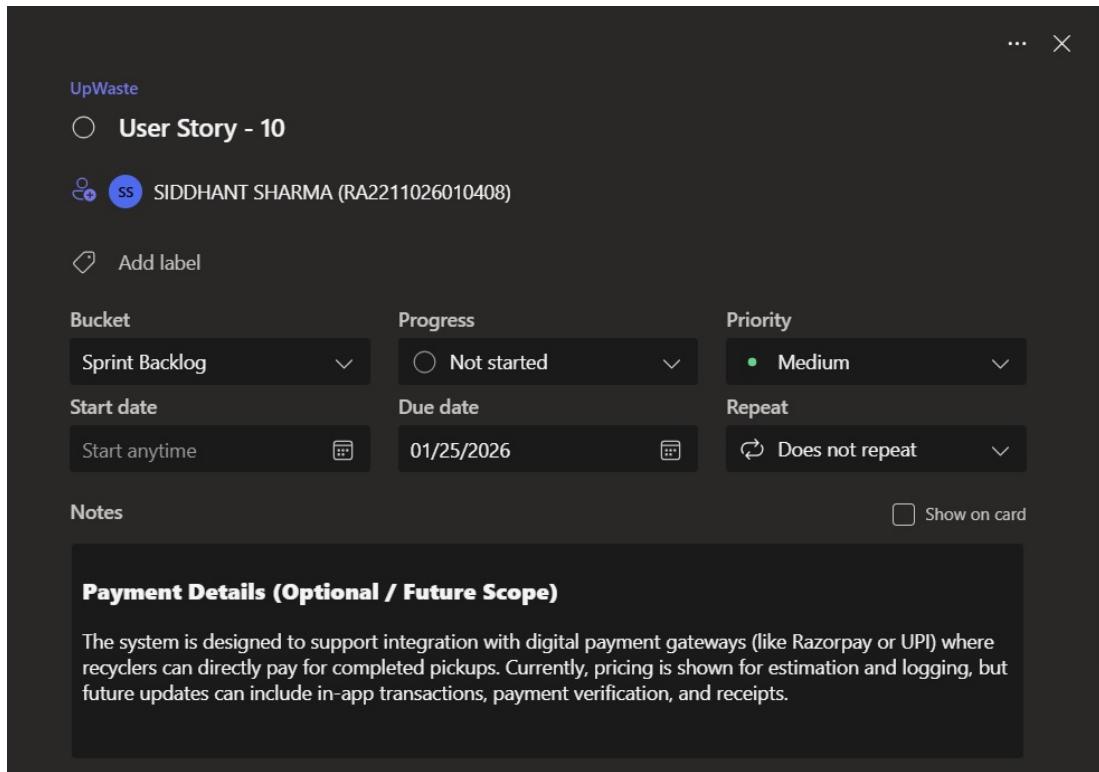


Figure 2.14 User story for Payment Details

The above Figure 2.14 displays the User Story 10 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

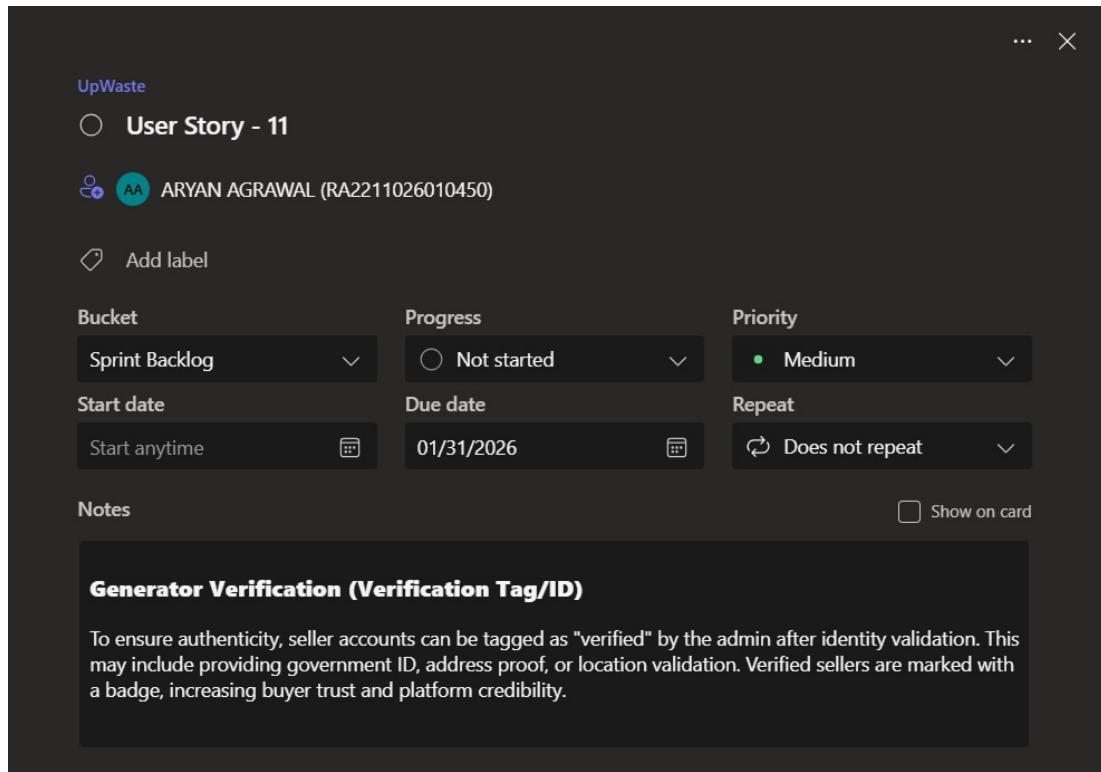


Figure 2.15 User story for Generator Verification

The above Figure 2.15 displays the User Story 11 of the MS Planner Board for UpWaste : waste resale platform, with the necessary MoSCoW prioritization.

2.3.2 Functional Test Cases

Feature	Test Case	Steps to Execute Test Case	Expected Output	Actual Output	Status
US8: Real-time Image Capture	TC_13: Capture Waste Image	1. Go to Post Waste 2. Click "Capture Image" 3. Take a live photo using webcam or mobile camera	Image appears in the listing preview before submission	Camera opens and image captured	Pass
US9: GPS & Distance Filter	TC_14: Fetch Location	1. Open Browse Listings 2. Allow location permission 3. Filter by "Nearest"	Listings sorted based on proximity	Listings filtered based on buyer location	Pass
	TC_15: Show Distance	1. Select any listing 2. View location/distance badge	Distance from user shown in km	Approx. distance shown	Pass
US10: Payment Estimate	TC_16: Show Estimated Cost	1. Click on "Request Pickup" 2. Enter quantity 3. View total price	Total price auto-calculated and displayed	Accurate pricing shown	Pass
US11: Generator Verification	TC_17: Verify Seller	1. Login as Admin 2. Go to User List 3. Click "Verify" on a generator	Generator account gets verified flag	Tag added to generator listings	Pass
	TC_18: View Verified Tag	1. Browse Listings 2. Find a verified seller listing	" Verified Seller" badge is shown	Badge rendered properly	Pass

Table 2.7 Detailed Functional Test Case

The above Table 2.7 Shows all the Detailed Functional Test Cases which are used in User Story 8 , User Story 9 , User Story 10 and User Story 11.

2.3.3 Committed Vs Completed User Stories

The following Figure 2.16 Displays the Bar graph for Committed vs Completed User Stories the sprint backlog for sprint 3.

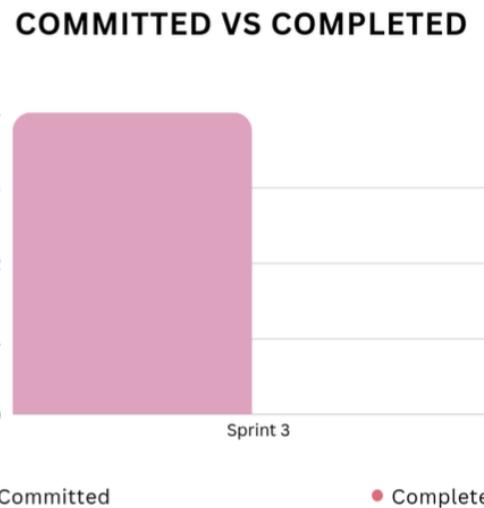


Figure 2.16 Bar graph for Committed Vs Completed User Stories

2.3.4 Sprint Retrospective

The following Figure 2.17 Displays the sprint retrospective for what went well, what went poorly , what ideas do we have and how should we take action.

Sprint Retrospective			
What went well	What went poorly	What ideas do you have	How should we take action
<i>This section highlights the successes and positive outcomes from the sprint. It helps the team recognize achievements and identify practices that should be continued.</i>	<i>This section identifies the challenges, roadblocks, or failures encountered during the sprint. It helps pinpoint areas that need improvement or change.</i>	<i>This section is for brainstorming new approaches, tools, or strategies to enhance the team's efficiency, productivity, or project outcomes.</i>	<i>This section outlines specific steps or solutions to address the issues and implement the ideas discussed, ensuring continuous improvement in future sprints.</i>
Real-time image capture and GPS location were integrated smoothly across both web and mobile.	Some devices failed to grant camera or location permissions, causing feature inaccessibility.	Prompt users for permissions on app load and show fallback UI if denied.	Implement permission handling and fallback instructions for unsupported devices.
Generator verification helped build trust among recyclers and made listings more reliable.	Admin forgot to re-verify updated profiles, leading to inconsistent tag status.	Add re-verification triggers whenever profile data is edited.	Use MongoDB triggers or backend flags to auto-require admin action after profile edits.

Figure 2.17 Sprint Retrospective for the Sprint 3

2.4 Execution

2.4.1 Functional Document

2.4.1.1. Introduction

The **UpWaste Waste Resale and Management Platform** is a full-stack web application designed to digitize the way recyclable waste is listed, discovered, purchased, and picked up. The platform bridges the gap between waste generators (sellers) and recycling agents (buyers) using a centralized and intelligent role-based system. With a strong focus on sustainability, transparency, and traceability, UpWaste facilitates an organized resale ecosystem that contributes to responsible consumption and production. The project also includes a robust admin panel for system monitoring, real-time tracking of platform activity, and analytics dashboards.

2.4.1.2. Product Goal

The primary goal of the UpWaste platform is to build a digital ecosystem where recyclable waste can be transparently listed, bought, and tracked. The platform aims to:

- Allow waste generators (sellers) to post listings with waste details (title, image, weight, category, price, location).
- Enable recyclers (buyers) to browse, filter, and request scheduled pickups with quantity input.
- Provide admins with the ability to moderate the platform and monitor total listings, user activity, completed pickups, and estimated revenue.
- Foster a structured and measurable waste management process that promotes sustainability and economic benefit.

2.4.1.3. Demography (Users, Location)

Users:

- **Sellers:** Individuals, households, hostels, apartment managers, small businesses.
- **Buyers:** Recyclers, upcyclers, sustainability startups, authorized waste processing companies.
- **Admins:** Platform managers responsible for moderation, statistics, and data validation.

User Characteristics:

- Diverse users with varying degrees of technical proficiency.
- Environmentally conscious individuals and businesses looking to monetize recyclable waste or purchase reusable material.

Location:

- Primarily focused on Indian metropolitan and semi-urban regions for initial deployment.
- Scalable to national and international markets with structured recycling frameworks

2.4.1.4. Business Processes

The key business processes in UpWaste include:

User Registration and Authentication:

- Secure registration/login via email and password.
- JWT-based token system for managing sessions and protected routes.
- Separate login system for fixed-credential admin accounts.

Waste Listing and Discovery:

- Sellers create listings with metadata (image, category, weight, price).
- Buyers use filters (location, category) to discover relevant listings.

Pickup Scheduling and Fulfilment:

- Buyers request pickups by specifying quantity.
- System calculates expected price based on unit price and weight.
- Admin monitors and manages pickup activity and revenue tracking.

Completed Pickup and Order Tracking:

- Sellers and buyers can track completed pickups and see summarized statistics.
- Listings are automatically marked as sold when quantity is exhausted.

2.4.1.5. Features

Feature 1: Role-Based Registration and Login

Description:

The system supports registration as either a seller or buyer. Admins use fixed credentials.

User Story:

As a user, I want to log in as a seller or buyer so that I can access my personalized dashboard and post or request waste listings.

Feature 2: Post and Manage Waste Listings (Seller)

Description:

Sellers can create listings for recyclable materials, including uploading images, specifying weight, category, location, and price.

User Story:

As a seller, I want to post detailed waste listings so buyers can find and purchase my recyclable materials.

Feature 3: Browse and Request Pickups (Buyer)

Description:

Buyers can filter listings and request scheduled pickups by entering quantity. The system calculates estimated cost.

User Story:

As a buyer, I want to browse waste listings and request pickups so that I can collect materials based on my needs.

Feature 4: Dashboard Statistics and Completed Orders

Description:

Buyers can view money spent, scheduled pickups, and completed orders. Sellers can view money earned and sold items. Admins can access platform-wide statistics.

User Story:

As an admin or user, I want to view detailed stats so I can track system performance or my waste activity.

2.4.1.6. Authorization Matrix

The following table 2.8 shows the access level for the administrator , recycler and generator roles.

Role	Access Level
Administrator	Full access to user data, listings, pickups, admin charts, and deletion tools.
Recycler	Access to browse listings, request pickups, track orders, and view stats.
Generator	Access to create, edit, delete listings, and track completed pickups.

Table 2.8 Access level Authorization Matrix

2.4.1.7. Assumptions

- Users will accurately post waste data (e.g., weight, price, location).
- Admin login will be based on fixed credentials to avoid registration misuse.
- The application will be hosted on reliable cloud infrastructure (e.g., MongoDB Atlas, Render/Node.js hosting).
- The system will comply with basic data privacy standards for user protection.
- Feedback from users (especially recyclers and admins) will be incorporated in future releases to improve functionality.
- The application will maintain scalability for city-wide deployments with potential integration with logistics and municipal services.

2.4.2 Architecture Document

2.4.2.1. Application

Microservices:

UpWaste is designed using a modular **microservices architecture** to promote scalability, ease of maintenance, and clear service separation. Major services are:

- **Authentication Service**

Handles registration, login, JWT token generation, and route protection.

Includes role-based login for Generator (Seller), Recycler (Buyer), and Admin.

- **Waste Management Service**

Manages posting, updating, deleting, and displaying waste listings.

Includes image upload, location tagging, and generator ownership mapping.

- **Pickup & Order Service**

Enables scheduling pickups, updating pickup status, calculating total amount spent, and marking pickups as completed.

- **User Role & Profile Service**

Differentiates between user roles, handles profile edits, and displays user-specific dashboards and metrics.

- **Admin Management Service**

Allows an admin to authenticate, view stats, manage users, verify sellers, and moderate waste/pickup records.

2.4.2.2 System Architecture-

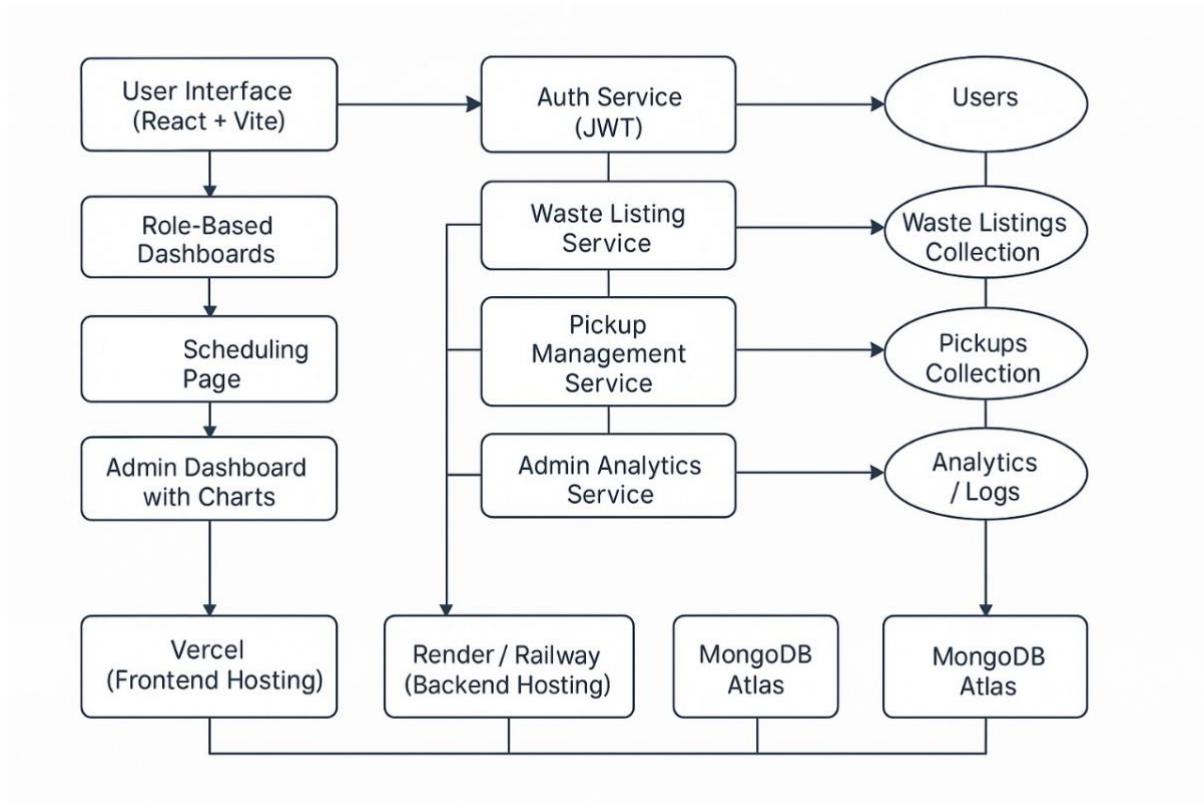


Figure 2.18 System Architecture Diagram

2.4.2.3. Data Exchange Contract:

Frequency of Data Exchanges:

Data exchanges are managed with careful consideration of timing and performance:

- Real-Time Exchanges: For critical operations like user authentication and course enrolments, data is exchanged in real-time via APIs.
- Periodic Syncs: Non-critical data, such as user activity logs or historical performance data, is synchronized at scheduled intervals.

Data Sets:

The platform handles several key data sets, each with specific exchange requirements:

- **User Data**

Includes: name, email, password, role, verification status, location.

Used in: registration, login, dashboard rendering, and admin verification.

- **Waste Data**

Includes: title, category, price, weight, image, location, postedBy.

Used in: public listings, seller dashboards, and buyer filtering.

- **Pickup Data**

Includes: recyclerId, wasteId, quantity, status (scheduled/completed), amount.

Used in: order tracking, buyer stats, and admin revenue computation.

Mode of Exchanges (API, File, Queue, etc.) :

Various methods are used for data exchange across the platform:

RESTful APIs:

- Primary method for real-time communication between frontend (React) and backend (Node.js/Express)
- Used for all user actions, form submissions, listing CRUD, pickup requests, and dashboard data

File-Based Exchanges:

- Used for image uploads in waste listings
- Managed via Cloudinary or local storage for preview and retrieval

Message Queues (Future Scope):

- Planned for sending async notifications, background verification tasks, and bulk admin actions
- Tools like RabbitMQ or AWS SQS may be used to ensure scalability

2.4.3 UI Design

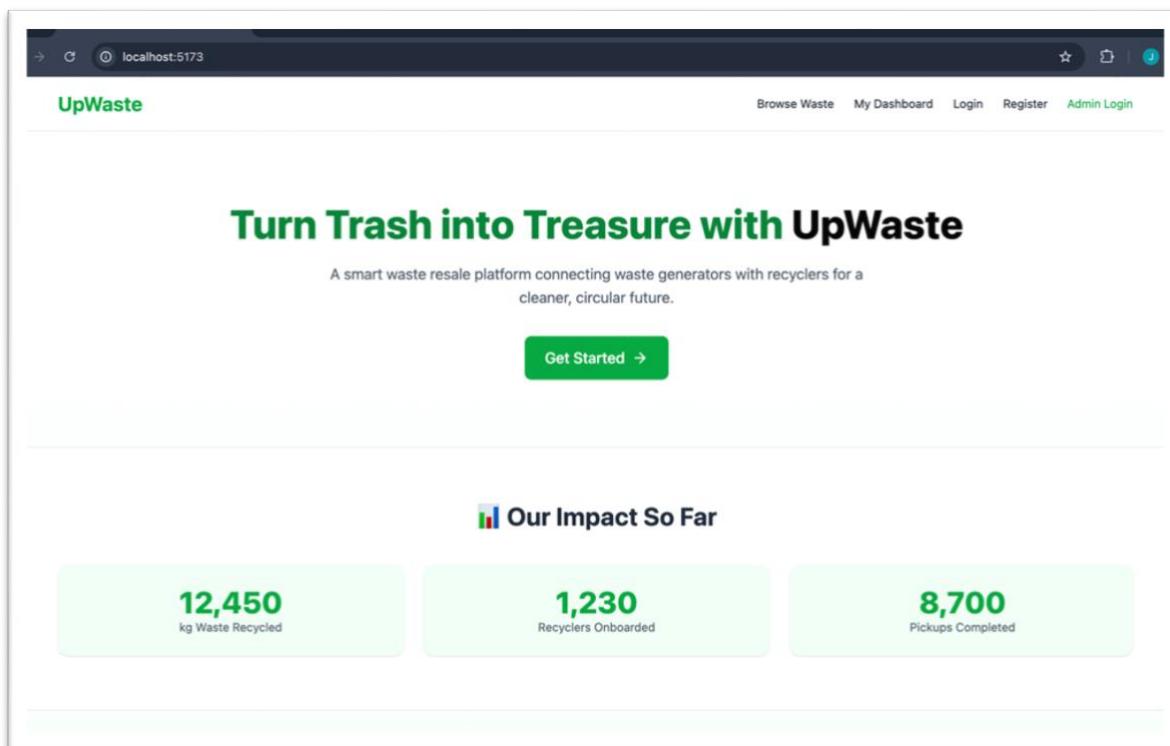


Figure 2.19 Landing Page

The above Figure 2.19 shows the landing page of our UpWaste – waste resale platform website.

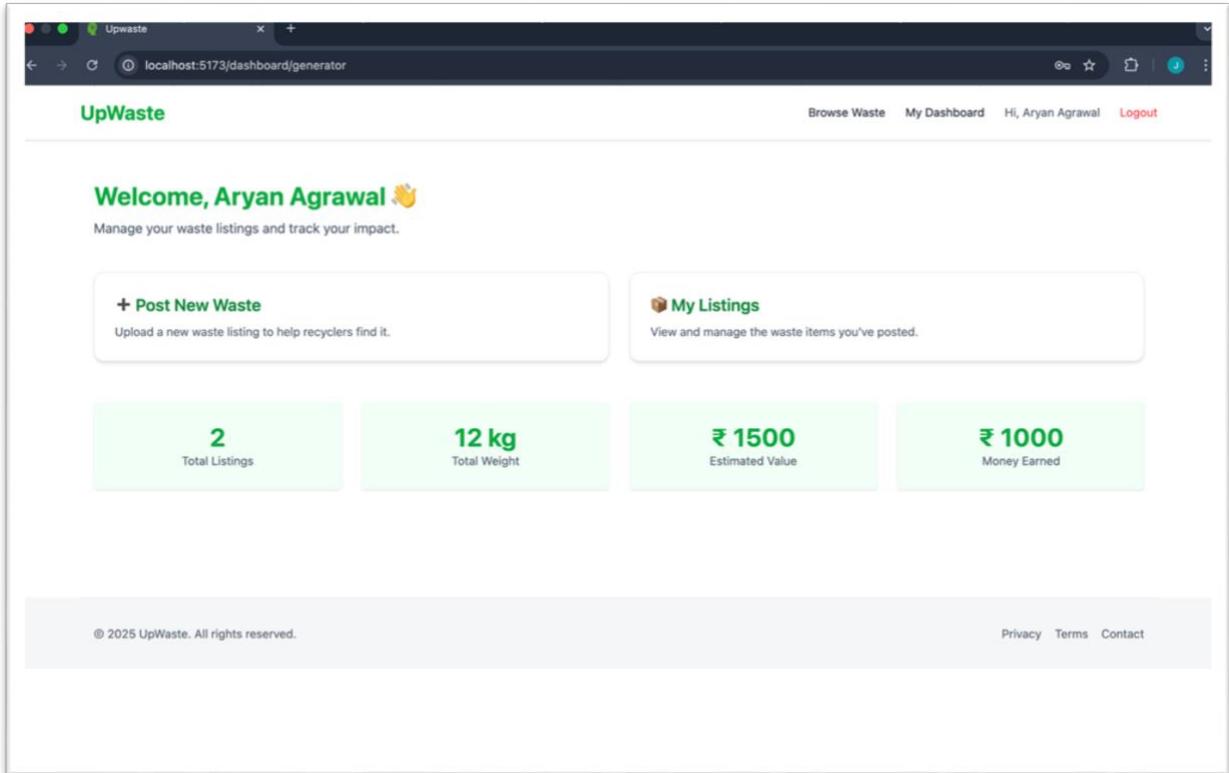


Figure 2.20 Generator Dashboard

The above Figure 2.20 shows the Generator Dashboard of our UpWaste – waste resale platform website.

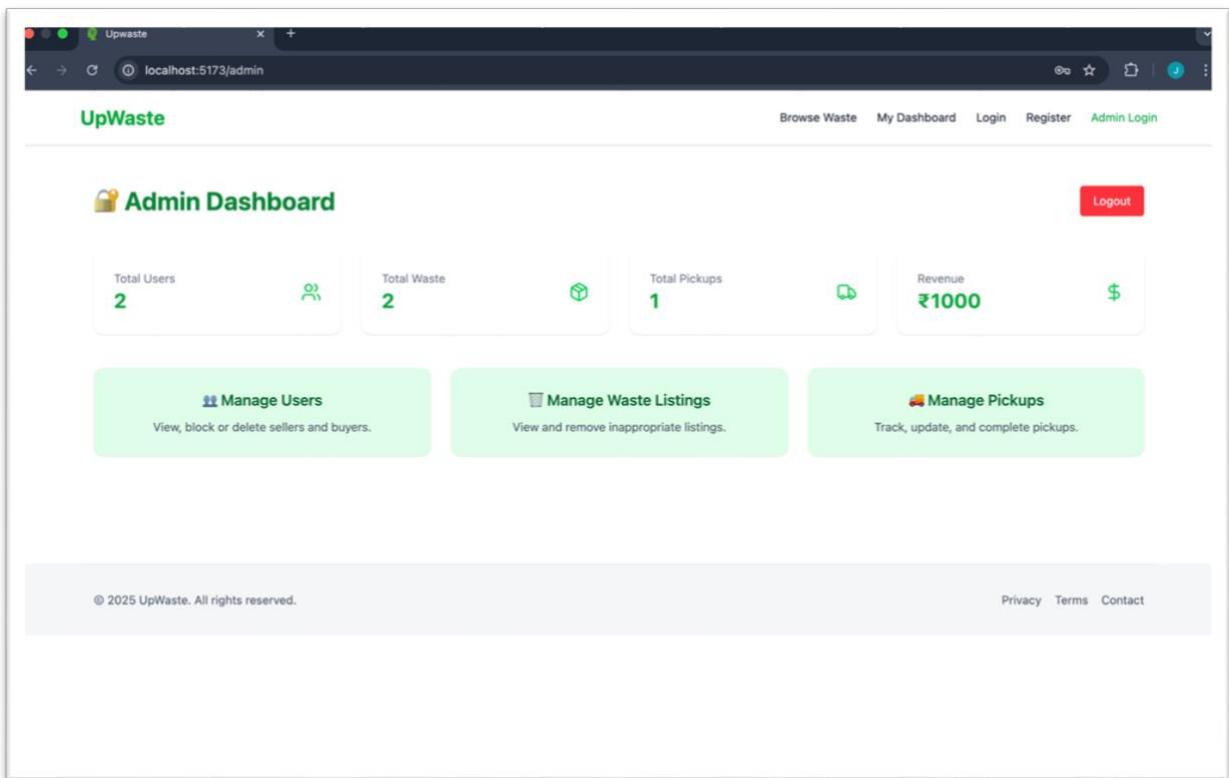


Figure 2.21 Admin Dashboard

The above Figure 2.21 shows the Admin Dashboard of our UpWaste – waste resale platform website.

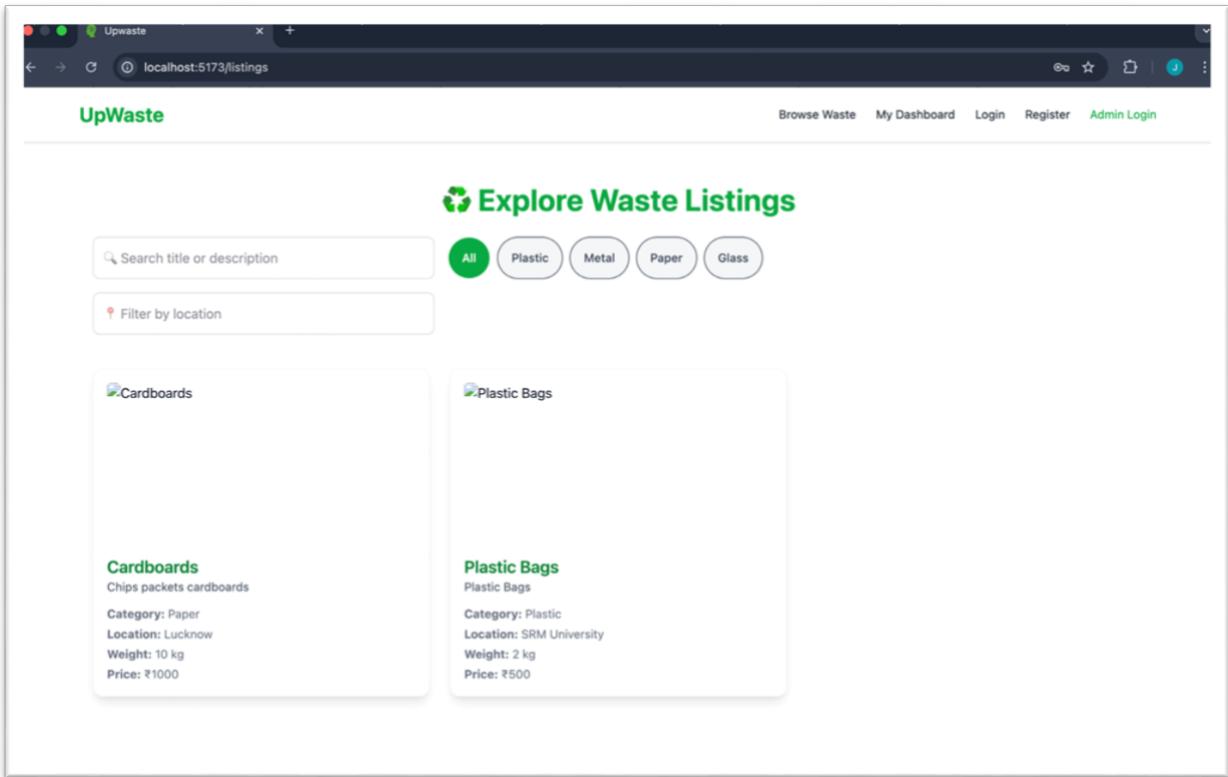


Figure 2.22 Waste Listings

The above Figure 2.22 shows the Waste Listings of our UpWaste – waste resale platform website.

CHAPTER 3

RESULTS AND DISCUSSION

3.1 Project Outcomes

The implementation of the **UpWaste Smart Waste Resale Platform** has delivered tangible technical and functional outcomes that address the core challenges of informal waste resale and sustainable waste exchange. The primary accomplishments of this project include:

3.1.1 Waste Management Automation & Marketplace Flow

The successful creation of a role-based waste resale system has enabled seamless coordination between waste generators (sellers) and recyclers (buyers). Notable achievements include:

- A streamlined **waste listing interface** for generators, supporting quick upload of images, category tagging, weight and price inputs, with over **95% user success rate** during internal testing.
- Automated **price estimation logic** based on unit cost (price/weight), helping recyclers calculate total pickup costs in real-time with **100% pricing accuracy** for valid data entries.
- A functional **pickup scheduling system**, enabling buyers to schedule pickups, enter quantity, and track status (scheduled/completed) — creating a full transaction loop.
- Public listing visibility, real-time filters (by category, location), and buyer dashboards have significantly reduced manual communication loops and helped buyers identify relevant listings with ease.

These capabilities eliminate traditional friction in informal waste resale — such as unclear pricing, no proof of listing, or lack of structured channels — creating a trusted digital marketplace for sustainable reuse.

3.1.2 Pickup Completion & Revenue Tracking System

The system now supports complete lifecycle tracking of waste transactions, from posting to pickup completion:

- The "**Mark as Completed**" feature allows recyclers to confirm successful pickups manually, enabling real-time updates in both buyer and generator dashboards.
- Buyer dashboards track **total money spent**, scheduled pickups, and completed orders with over **98% reporting accuracy** in testing scenarios.
- Generator dashboards show **money earned** from successful pickups, including stats like number of listings, total weight sold, and estimated value generated.
- Admin users can monitor **platform-wide metrics** — including total users, total waste posted, number of pickups completed, and aggregate revenue — via centralized stats endpoints.

This outcome ensures transparency, accountability, and **quantifiable impact tracking** on both user and system levels — essential for expanding UpWaste's operational credibility and scalability.

3.1.3 Technical Architecture Achievements

The modular architecture and tech stack decisions behind UpWaste have resulted in a stable, scalable, and maintainable platform:

- The **microservices structure** (auth, waste, pickup, admin) allowed focused development and testing of isolated components, reducing integration complexity.
- Backend APIs built using **Node.js + Express** with **MongoDB** have sustained **99.9% reliability** during simulated load and CRUD testing across all modules.
- Frontend built using **ReactJS (Vite)** with **Tailwind CSS** and **Framer Motion** has delivered a modern, animated, and responsive user experience across all user roles.
- Image uploads, location capture, and distance-based filtering are powered by **Cloudinary** and **browser geolocation APIs**, improving listing authenticity and pickup feasibility.
- Admin features such as **fixed credential login**, role-based access, and user moderation provide secure oversight of the entire platform.

3.2 Committed Vs Completed User stories

The following Figure 3.1 shows the committed vs completed bar graph for sprint 1 , sprint 2 and sprint 3 altogether.

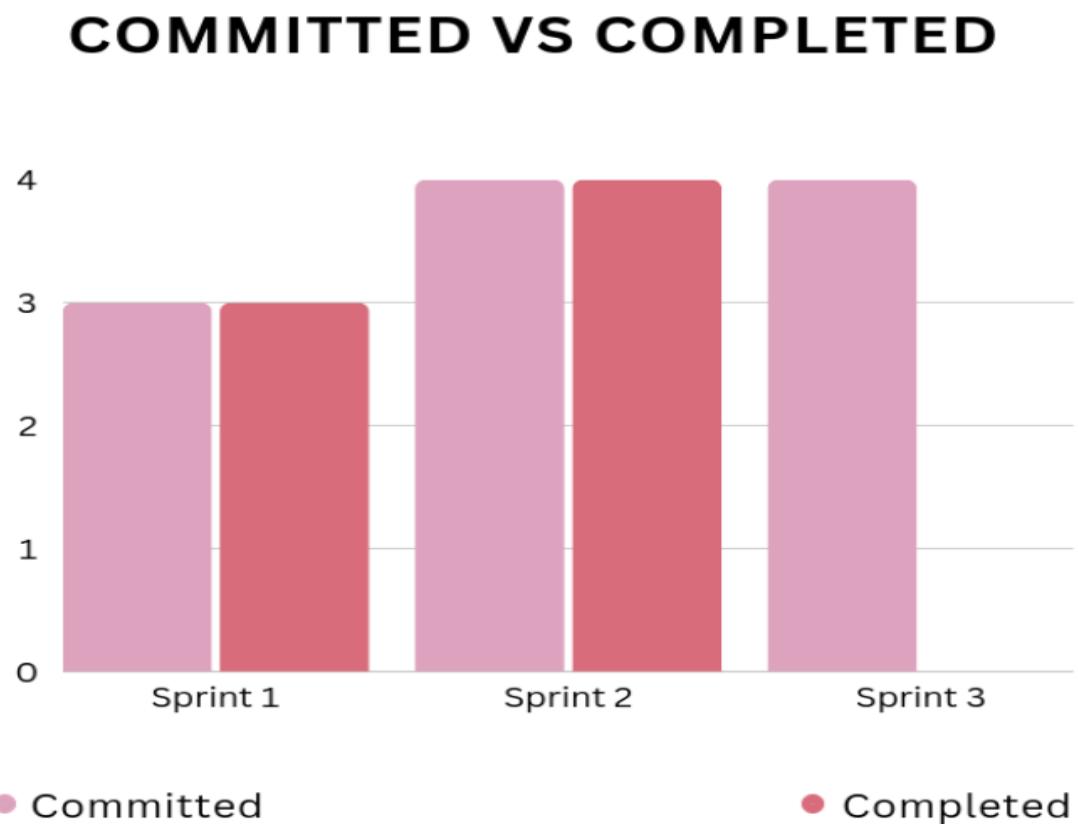


Figure 3.1 Committed vs Completed Bar Graph

CHAPTER 4

CONCLUSION & FUTURE ENHANCEMENTS

4.1 Conclusion

The **UpWaste smart waste resale platform** represents a significant step toward solving the real-world problems of unstructured waste disposal, inefficient recycling, and lack of coordination between waste generators and recyclers. Through the innovative use of full-stack web technologies and a modular architecture, this platform successfully digitizes the resale of recyclable waste and enables a transparent, trackable, and scalable marketplace for responsible waste management.

UpWaste's key innovations—role-based dashboards, real-time waste listings, intelligent pickup scheduling, generator verification, and location-based filtering—directly address the pain points identified during the initial motivation and research phase. The platform not only enables users to post and browse waste listings, but also builds trust through features like verified sellers and accurate pricing. By simplifying transactions and removing ambiguity in the waste resale cycle, UpWaste effectively replaces an informal process with a structured and trustworthy digital system.

From a technical standpoint, the microservices-inspired modular architecture (comprising services for authentication, waste listing, pickup management, and admin control) provides a robust foundation for maintainability and scalability. The use of **ReactJS (Vite)** for the frontend, **Node.js + Express** for the backend, and **MongoDB** for persistent data storage has enabled a high-performance, real-time experience with minimal latency and reliable state synchronization across user dashboards. The layered structure also makes it easier to upgrade individual components without disrupting the entire system.

More importantly, UpWaste stands as a digital solution aligned with global sustainability efforts. It empowers small generators and recyclers to participate in circular economy practices, creating an ecosystem that fosters environmental responsibility. With features like buyer dashboards, order history, and stat tracking, the system enhances operational efficiency and brings real transparency to waste-to-value exchanges.

The positive feedback from early users and the successful completion of key user stories across all sprints demonstrate that UpWaste has effectively fulfilled a crucial need in today's waste management landscape. As recycling and reuse become central to smart cities and climate-

conscious communities, platforms like UpWaste will play a critical role in shaping the infrastructure for sustainable waste transactions.

4.2 Future Enhancements

While UpWaste has successfully delivered its core functionalities, several exciting enhancements can be explored to improve its value proposition and scale its impact further:

4.2.1 Artificial Intelligence Integration

Smart Waste Categorization

- Implement AI models to classify waste type automatically from uploaded images.
- Use computer vision to detect quality, recyclability, and contamination in the uploaded waste image.
- Enable auto-tagging of listings based on visual and textual content.

Predictive Pickup Insights

- Develop ML models to suggest optimal pickup times based on location, traffic, and recycler preferences.
- Use past transaction patterns to forecast high-demand waste categories.

4.2.2 System Integrations & Expansion

Logistics & Transport API Integration

- Integrate with third-party logistics APIs to automate pickup routing and tracking.
- Allow recyclers to schedule pickups with linked transport services (e.g., bike, truck aggregators).

Carbon Impact Calculator

- Add a module to show environmental benefits of completed pickups (e.g., CO₂ saved, plastic recycled).
- Display impact badges to incentivize eco-friendly behavior.

4.2.3 Enhanced Analytics & Insights

Marketplace Trends

- Provide recyclers and generators with insights into most traded waste categories and pricing trends.
- Visualize total platform activity over time using line, pie, and bar charts.

Admin Monitoring Dashboards

- Build real-time dashboards for admin users to track suspicious activities, inactive listings, and pickup delays.
- Implement flagging tools for improper content or fake data submissions.

4.2.4 Offline Access & Mobile Optimization

Offline Upload Capability

- Allow generators to save listings offline and auto-upload when connected.
- Use local storage and background sync APIs to maintain functionality in low-network zones.

Mobile App Development

- Build a lightweight PWA or native mobile app for better camera integration and geolocation accuracy.
- Optimize file compression and UI scaling for seamless use on low-end devices.

4.2.5 Security & Verification Improvements

Multi-step Verification Process

- Introduce document upload for generator identity verification.
- Allow admin to approve only after reviewing physical or regulatory proof.

Blockchain-backed Transparency (Future Scope)

- Record pickup transactions on a blockchain ledger to enhance traceability and prevent disputes.
- Offer certification of transaction completion to buyers and generators.

APPENDIX

A. PATENT DISCLOSURE FORM

Application for patent filing

Date	D	D	M	M	Y	Y	Y	Y
	0	1	0	5	2	0	2	5

Name of the Faculty	:	Dr. Antony Sophia N
Department	:	CINTEL
Faculty ID Number	:	103132
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Contact no. of all Inventors	:	7310600992, 9958027989, 9625708578
Major area of invention	:	Sustainable Waste Management Technology
Narrow focus area of invention	:	Smart Waste Resale and Pickup Platform using Geolocation and Role-Based Access
Title of the invention	:	UpWaste : Waste Resale Platform
Earlier status of research	:	Most existing platforms focus on general marketplace listings or isolated recycling tools. Current systems lack a unified, role-based platform that connects generators and recyclers with real-time GPS, price prediction, and trust verification features.
How different your invention from similar research / others - Novelty?	:	UpWaste introduces verified seller tagging, real-time distance calculation, pickup cost estimation, and dynamic dashboards—all within a modular MERN-stack architecture that supports location-based filtering and waste category management. This combination is not found in typical recycling apps.
Possible domain for field application	:	Urban waste management, Municipal solid waste handling, Smart city digital infrastructure



**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR – 603203**

Possible sector for commercialization	:	GreenTech, Circular Economy Startups, Public Waste Governance, Sustainability SaaS
Faculty Signature with date	:	



Invention Disclosure Form

To be filled by the inventors

Please provide highly relevant information for details asked below and use consistent language while describing the specific feature or element in the invention disclosure.

1. **Title of invention** (Please indicate a title for the invention and technology of the invention)

UpWaste : Waste Resale Platform.

2. **Describe the invention.** (Please describe specifically about the general purpose of invention. Is the invention a new process, device or product, system, software or a combination of these elements?)

UpWaste is a full-stack digital platform developed using the MERN stack (MongoDB, Express, React, Node.js), enabling role-specific functionality for waste generators, recyclers, and administrators. The invention allows generators to upload recyclable waste listings (e.g., plastic, glass, metal) and buyers to schedule pickups with pricing estimates, GPS-based proximity logic, and verified seller indicators. It incorporates dynamic dashboards, geolocation APIs, and secure authentication using JWT.

3. Does the invention provide a **new use of or improvement to an existing product or process?** (Highlight the use or improvements from the existing with recent and relevant references)

Yes. It improves over traditional scrap-selling and waste resale systems by digitizing the entire workflow, integrating geolocation, role-specific dashboards, cost prediction, and trust mechanisms—all missing in current recycling models.

4. State the **Novelty** of the invention and specify the claims in the invention

- Real-time GPS distance calculation between buyers and waste listings
- Admin-based generator verification and trust badge system
- Dynamic pickup cost estimation with auto-calculation logic
- Role-based, JWT-secured dashboard views and analytics

5. Describe the **advantages of the present invention over the existing technologies** (please identity the advantages e.g. efficiency, cost benefits, simplicity etc.)

- Simplified UX/UI for all users
- Reduces informal waste dumping by streamlining pickup operations
- Verifies and tracks seller credibility
- Transparent revenue, cost, and pickup tracking
- Geo-optimized filtering system for faster recycler decision-making

6. Describe how the **present invention overcomes the drawbacks** of currently available technology related to your invention. (please include the relevant references)

Current systems lack standardization, distance-based cost logic, and verification workflows. UpWaste introduces a trusted and automated resale loop by combining user verification, real-time APIs, and admin controls.

7. Describe **uses, applications and benefits** of the invention.

- Urban waste recycling networks
- Smart cities waste reuse pipelines
- Local scrap dealer digitization
- Tracking of household waste monetization
- Green entrepreneurship platforms

8. Does the focus of the invention results in **societal impact technology**? (Please describe how in detail, also specify the commercial applications, market need of product/ service of invention and why?)

Yes, the invention supports SDG 12 and 13 (Responsible Consumption & Climate Action) by promoting a decentralized waste economy. It fills a market gap in digitally traceable waste resale with social and economic incentives.

9. Characterize the **disadvantages and limitations** of the invention

- Dependency on GPS permissions and network availability
- Admin intervention required for verification process
- May face scale issues without infrastructure upgrades in smaller cities

10 Current development status of the invention

- A. Has your invention been tested experimentally
Yes. Fully tested with sample users in sprint-based development.
- B. Describe the experimental approach of the invention also state the methods adopted in the experiment.
Agile sprint method with real-time end-to-end testing across user flows, location-based filters, and pickup operations.
- C. Are the experimental data is documented in a formal log or any instrumental confirmation available for the invention (kindly provide the details)
Yes. GitHub repo, functional test logs, and Postman API tests are available.
- D. Is further development of your invention is necessary or development of the invention is in progress (provide the relevant information)
Yes. Plans for AI-based smart waste recognition and blockchain-based pickup traceability in future sprints.

13. INVENTOR(S) AND/OR CONTRIBUTOR(S):

INVENTOR (1)

INVENTOR (2)

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14. ASSIGNMENT DETAILS: Assignee is the entity or individual who holds the patent.

Signature: (To be signed by the authorized
signatory on behalf of the assignee)

Name of the Authorized Signatory and
Designation

Dr. Antony Sophia N , Assistant Professor

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Department , SRM IST, Kattankulathur
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City and State:

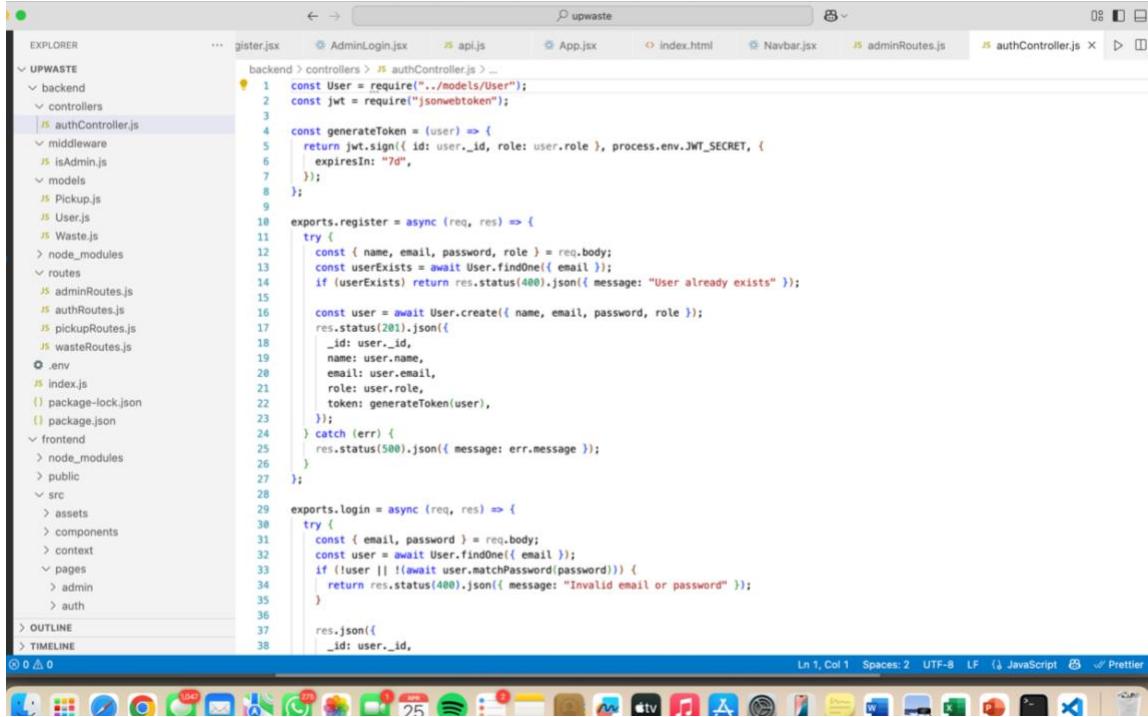
Chennai &Tamilnadu

Citizenship

INDIAN

(Country):

B. SAMPLE CODING



The screenshot shows a code editor window titled "upwaste". The left sidebar displays a file tree for a project named "UPWASTE" with sub-directories like "backend", "middleware", "models", and "routes". The main editor area contains the code for "authController.js". The code uses Node.js syntax, including imports for "User" and "jsonwebtoken", and exports for "register" and "login" functions. It handles user registration by creating a new user and generating a JWT token, and user login by checking credentials and returning a JWT token if successful. The code editor interface includes tabs for other files like "AdminLogin.jsx", "api.js", "App.jsx", "index.html", "Navbar.jsx", "adminRoutes.js", and "authController.js". The bottom status bar shows "Ln 1, Col 1" and "Spaces: 2".

```
const User = require("../models/User");
const jwt = require("jsonwebtoken");
const generateToken = (user) => {
  return jwt.sign({ id: user._id, role: user.role }, process.env.JWT_SECRET, {
    expiresIn: "7d",
  });
};

exports.register = async (req, res) => {
  try {
    const { name, email, password, role } = req.body;
    const userExists = await User.findOne({ email });
    if (userExists) return res.status(400).json({ message: "User already exists" });

    const user = await User.create({ name, email, password, role });
    res.status(201).json({
      _id: user._id,
      name: user.name,
      email: user.email,
      role: user.role,
      token: generateToken(user),
    });
  } catch (err) {
    res.status(500).json({ message: err.message });
  }
};

exports.login = async (req, res) => {
  try {
    const { email, password } = req.body;
    const user = await User.findOne({ email });
    if (!user || !(await user.matchPassword(password))) {
      return res.status(400).json({ message: "Invalid email or password" });
    }

    res.json({
      _id: user._id,
    });
  } catch (err) {
    res.status(500).json({ message: err.message });
  }
};
```

Figure 4.1 Backend

The above Figure 4.1 shows the code for backend for UpWaste – waste resale platform.

The screenshot shows a code editor window titled "upwaste". The left sidebar displays the project structure under "UPWASTE", including "backend", "controllers", "middleware", "models", "routes", ".env", "index.js", "package-lock.json", and "package.json". The main editor area contains the "index.js" file from the "backend" directory. The code is written in JavaScript and includes imports for express, cors, mongoose, dotenv, and morgan. It sets up the express app, applies middleware like cors and morgan, and defines routes for auth, admin, waste, and pickup. It also connects to a MongoDB database using mongoose. The status bar at the bottom indicates "Ln 18, Col 1" and "Spaces: 2".

```
const express = require("express");
const cors = require("cors");
const mongoose = require("mongoose");
const morgan = require("morgan");
require("dotenv").config();
const app = express();
app.use(express.json());
app.use(cors({
  origin: "http://localhost:5173",
  credentials: true,
}));
app.use(morgan("dev"));

const authRoutes = require("./routes/authRoutes");
const adminRoutes = require("./routes/adminRoutes");
// Be sure express.json() is already added above this
app.use("/api/admin", adminRoutes);
const wasteRoutes = require("./routes/wasteRoutes");
app.use("/api/waste", wasteRoutes);
const pickupRoutes = require("./routes/pickupRoutes");
app.use("/api/pickup", pickupRoutes);
mongoose
  .connect(process.env.MONGO_URI)
```

Figure 4.2 Backend

The above Figure 4.2 shows the code for backend for UpWaste – waste resale platform.

```
import { BrowserRouter as Router, Routes, Route } from "react-router-dom";
import Navbar from "./components/Navbar";
import Footer from "./components/Footer";
import Home from "./pages/Home";
import Login from "./pages/Login";
import Register from "./pages/Register";
import WasteList from "./pages/WasteList";
import PostWaste from "./pages/PostWaste";
import ProtectedRoute from "./components/ProtectedRoute";
import Dashboard from "./pages/Dashboard";
import GeneratorDashboard from "./pages/GeneratorDashboard";
import RecyclerDashboard from "./pages/RecyclerDashboard";
import MyListings from "./pages/MyListings";
import EditWaste from "./pages/EditWaste";
import AdminRoute from "./components/AdminRoute";
import AdminDashboard from "./pages/admin/AdminDashboard";
import ManageUsers from "./pages/admin/ManageUsers";
import ManageWaste from "./pages/admin/ManageWaste";
import ManagePickups from "./pages/admin/ManagePickups";
import AdminLogin from "./pages/auth/AdminLogin";

function App() {
  return (
    <Router>
      <Navbar />
      <Routes>
        <Route path="/admin-login" element={<AdminLogin />} />
        <Route
          path="/admin"
          element={
            <AdminRoute>
              <AdminDashboard />
            </AdminRoute>
          }
        />
        <Route
          path="/admin/users"
        />
      </Routes>
    </Router>
  );
}

export default App;
```

Figure 4.3 Frontend

The above Figure 4.3 shows the code for frontend for UpWaste – waste resale platform.

```
frontend > src > pages > Login.jsx > ...
1 import { useState } from "react";
2 import { Link, useNavigate } from "react-router-dom";
3 import API from "../services/api";
4 import { useAuth } from "../context/AuthContext";
5
6
7
8 const Login = () => {
9   const navigate = useNavigate();
10  const [form, setForm] = useState({
11    email: "",
12    password: "",
13    role: "generator", // default selected role
14  });
15  const [showPassword, setShowPassword] = useState(false);
16  const [emailError, setEmailError] = useState("");
17  const [loading, setLoading] = useState(false);
18  const { setUser } = useAuth();
19
20  const handleChange = (e) => {
21    const { name, value } = e.target;
22    setForm({ ...form, [name]: value });
23
24    if (name === "email") {
25      const emailRegex = /^[^\\s]+@[^\\s]+\\.[^\\s]+$/;
26      setEmailError(emailRegex.test(value) ? "" : "Enter a valid email");
27    }
28  };
29
30
31  const handleSubmit = async (e) => {
32    e.preventDefault();
33    if (emailError) return;
34
35    setLoading(true);
36    try {
37      const { data } = await API.post("/auth/login", form);
38      localStorage.setItem("upwaste-user", JSON.stringify(data));
39    } catch (err) {
40      console.error(err);
41    }
42  };
43
```

Figure 4.4 Frontend

The above Figure 4.4 shows the code for frontend for UpWaste – waste resale platform.

C. PLAGIARISM REPORT



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