

## Trash Track: A Location-Based Application

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**Abstract:** *The paper introduced the garbage collector system for maintaining hygienic conditions in a smart city. Our system is designed to solve this issue and will provide complete details of the vehicles located in the different areas throughout the city. The concerned public can access the information anywhere and anytime to get the details. Accordingly, they can decide on this immediately. The key aspect of this system is to collect garbage from the public. An Android application will provide us with the exact garbage status. GPS employed will pinpoint the exact location of the vehicle. A central feature of this app is its live tracking system, enabling users to monitor the precise location of the garbage truck in real time. Additionally, it offers estimated arrival times, effectively reducing waiting times for residents and optimizing the waste collection process. What truly sets this application apart is its focus on community engagement. By actively involving residents in the waste management process, it encourages shared responsibility and cooperation among city dwellers, fostering a cleaner environment and ensuring timely and efficient waste collection. Furthermore, this project serves as a testament to the transformative power of modern technology in enhancing traditional municipal services. It exemplifies how integrating cutting-edge technology can effectively address longstanding challenges and enhance the quality of life for residents in smart cities. The scalability and adaptability of this application make it a valuable asset for optimizing waste management in various urban settings. Its data analytics capabilities provide city officials with valuable insights, enabling more informed decision-making and a proactive approach to waste management.*

**Keywords:** *Garbage Collector, Location-Based Garbage Collection Application, GPS-Based Location Tracking, etc.*

### I. INTRODUCTION

The Garbage Collection App is a revolutionary software solution designed to address the challenges of waste management by leveraging modern technologies and providing a user-centric platform. Developed using Flutter Dart for the front end and Supabase for the back end, this app offers a comprehensive system for reporting waste, managing collection tasks, and monitoring activities related to waste disposal.

In today's world, efficient waste management is critical for maintaining environmental sustainability and public health. Traditional waste collection methods often lack transparency and real-time communication, leading to inefficiencies and environmental hazards. The Garbage Collection App seeks to bridge this gap by providing a digital platform that empowers users, drivers, and administrators to collaborate effectively in waste management efforts.



With the Garbage Collection App, users can easily report waste in their vicinity by uploading images and providing location details. They can track the status of their reports in real-time and receive notifications on updates. Drivers, on the other hand, can efficiently manage waste collection tasks assigned to them, mark tasks as completed, and access optimized route maps for streamlined operations. Administrators have access to a comprehensive dashboard for system oversight, user management, report monitoring, task assignment, and analytics generation.

By utilizing Flutter Dart and Supabase, the Garbage Collection App offers a seamless user experience across various mobile platforms while ensuring robust backend functionality, data security, and scalability. Integration with Google Maps API facilitates accurate location services and route optimization, enhancing the efficiency of waste collection operations. Real-time notifications powered by Firebase Cloud Messaging keep all stakeholders informed and engaged throughout the waste management process.

In summary, the Garbage Collection App represents a significant advancement in waste management technology, providing a user-friendly, efficient, and sustainable solution for addressing the challenges of waste collection and disposal. With its innovative features and comprehensive functionalities, the app is poised to make a positive impact on environmental conservation and community well-being.

## II. LITERATURE REVIEW

Waste management is a critical aspect of environmental sustainability and public health. Various studies and research papers have explored different approaches, technologies, and strategies for improving waste management practices.

Here's a literature review summarizing key findings and insights from relevant sources:

### 1. Technology in Waste Management:

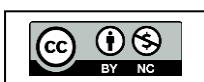
According to research by Khan et al. (2020), the integration of technology in waste management processes has shown promising results in enhancing efficiency, reducing costs, and minimizing environmental impact. IoT sensors, AI, and data analytics play a significant role in optimising waste collection, sorting, and recycling operations.

### 2. Mobile Applications for Waste Reporting:

Studies by Hossain et al. (2018) and Khatoun et al. (2021) highlight the effectiveness of mobile applications in waste reporting and management. Mobile apps provide a user-friendly platform for citizens to report waste incidents, leading to faster response times and improved coordination between stakeholders involved in waste management.

### 3. Real-Time Monitoring and Analytics:

Research by Kumar et al. (2019) emphasises the importance of real-time monitoring and analytics in waste management systems. Real-time data collection and analysis enable stakeholders to make informed decisions, optimize resource allocation, and identify areas for improvement in waste collection, transportation, and disposal processes.



**4. Community Engagement and Participation:**

Studies by Fauziah et al. (2020) and Al-Salem et al. (2017) underscore the role of community engagement and participation in waste management initiatives. Engaging citizens through awareness campaigns, education programs, and participatory approaches fosters a sense of responsibility and ownership, leading to more sustainable waste management practices.

**5. Cloud-Based Solutions for Waste Management:**

Research by Lin et al. (2018) and Son et al. (2020) explores the benefits of cloud-based solutions in waste management systems. Cloud platforms offer scalability, flexibility, and cost-effectiveness, allowing organizations to streamline operations, improve data accessibility, and enhance collaboration among stakeholders.

**6. Open-Source Solutions for Backend Infrastructure:**

Studies by Li et al. (2021) and Muhammad et al. (2019) discuss the advantages of using open-source backend infrastructure for waste management applications. Open-source platforms such as Supabase provide a cost-effective and customizable solution for managing user data, authentication, and real-time communication in waste management systems.

**7. Challenges and Opportunities in Waste Management:**

Research by Pizarro-Tapia et al. (2020) and Akinyele et al. (2018) identify various challenges and opportunities in waste management, including inadequate infrastructure, lack of public awareness, and limited resources. Addressing these challenges requires a multi-faceted approach involving technological innovation, policy interventions, and community engagement.

Overall, the literature review highlights the importance of leveraging technology, community engagement, and data-driven approaches in improving waste management practices. Mobile applications, real-time monitoring, cloud-based solutions, and open-source technologies offer promising avenues for enhancing efficiency, sustainability, and resilience in waste management systems. The Garbage Collection App aims to build upon these insights by providing a comprehensive and user-friendly platform for waste reporting, collection, and management, leveraging modern technologies and best practices in the field.

**III. PROPOSED OBJECTIVE**

The primary objective of the Garbage Collection App is to revolutionize waste management processes by leveraging modern technologies and providing a comprehensive solution that addresses the challenges faced in waste collection and disposal. The key objectives of the app include:

**1. Efficient Waste Reporting:**

Enable users to report waste in their vicinity quickly and accurately by uploading images and providing location details. This facilitates timely identification and resolution of waste disposal issues.



**2. Streamlined Waste Collection:**

Provide drivers with tools to efficiently manage waste collection tasks, including accessing assigned tasks, marking tasks as completed, and optimizing collection routes. This ensures timely and effective waste collection operations.

**3. Effective System Management:**

Empower administrators with comprehensive tools for managing the entire waste management system. This includes user management, report monitoring, task assignment, and analytics generation to ensure smooth and transparent operations.

**4. Enhanced Communication and Transparency:** Facilitate real-time communication between users, drivers, and administrators through notifications and status updates. This promotes transparency and accountability in waste management processes.

**5. User Engagement and Participation:**

Encourage active participation from users in waste management efforts by providing them with a user-friendly platform to report waste and track the progress of their reports. This fosters community engagement and collective responsibility towards environmental conservation.

**6. Optimization of Resources:**

Utilize modern technologies such as image processing, route optimization, and cloud-based services to optimize resource utilization and improve the efficiency of waste management operations.

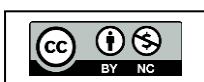
**7. Environmental Conservation:**

Contribute to environmental sustainability by promoting proper waste disposal practices, reducing littering, and minimizing the environmental impact of waste accumulation through timely and effective waste collection.

Overall, the objective of the Garbage Collection App is to provide a holistic solution that addresses the complexities of waste management, enhances operational efficiency, fosters community engagement, and promotes environmental conservation. By achieving these objectives, the app aims to make a positive impact on waste management practices and contribute towards building cleaner and healthier communities.

**IV. MODULES**

The Garbage Collection App is divided into several modules, each serving a specific purpose and catering to the needs of different stakeholders involved in waste management. These modules ensure efficient coordination, communication, and management of waste collection activities. The main modules of the app include:





### 1. User Module:

**Functionality:** This module is designed to enable users to report waste in their surroundings and actively participate in waste management efforts.

#### Key Features:

- User Registration and Authentication: Users can create accounts and securely log in to the app.
- Waste Reporting: Users can report waste by uploading images, adding location details, and providing relevant information.
- Report Tracking: Users can track the status of their reported waste, including updates on collection progress.
- Editing and Deleting Reports: Users have the option to edit or delete their waste reports if necessary.
- Notifications: Users receive real-time notifications about the status of their reports and other relevant updates.

### 2. Driver Module:

**Functionality:** This module is tailored to meet the needs of drivers responsible for waste collection tasks.

#### Key Features:

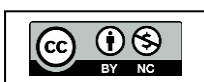
- Driver Registration and Authentication: Drivers can register accounts and securely log in to access their tasks
- Task Management: Drivers can view a list of assigned waste collection tasks and manage them efficiently.
- Task Completion: Drivers can mark tasks as completed once the waste collection is done.
- Real-time Updates: Drivers receive real-time updates on new tasks, task assignments, and changes in task status.
- Route Optimization: Drivers can access optimized route maps to streamline waste collection routes and minimize travel time.

### 3. Admin Module:

**Functionality:** This module provides administrative tools for managing the overall operation of the waste management system.

#### Key Features:

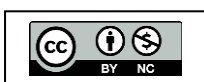
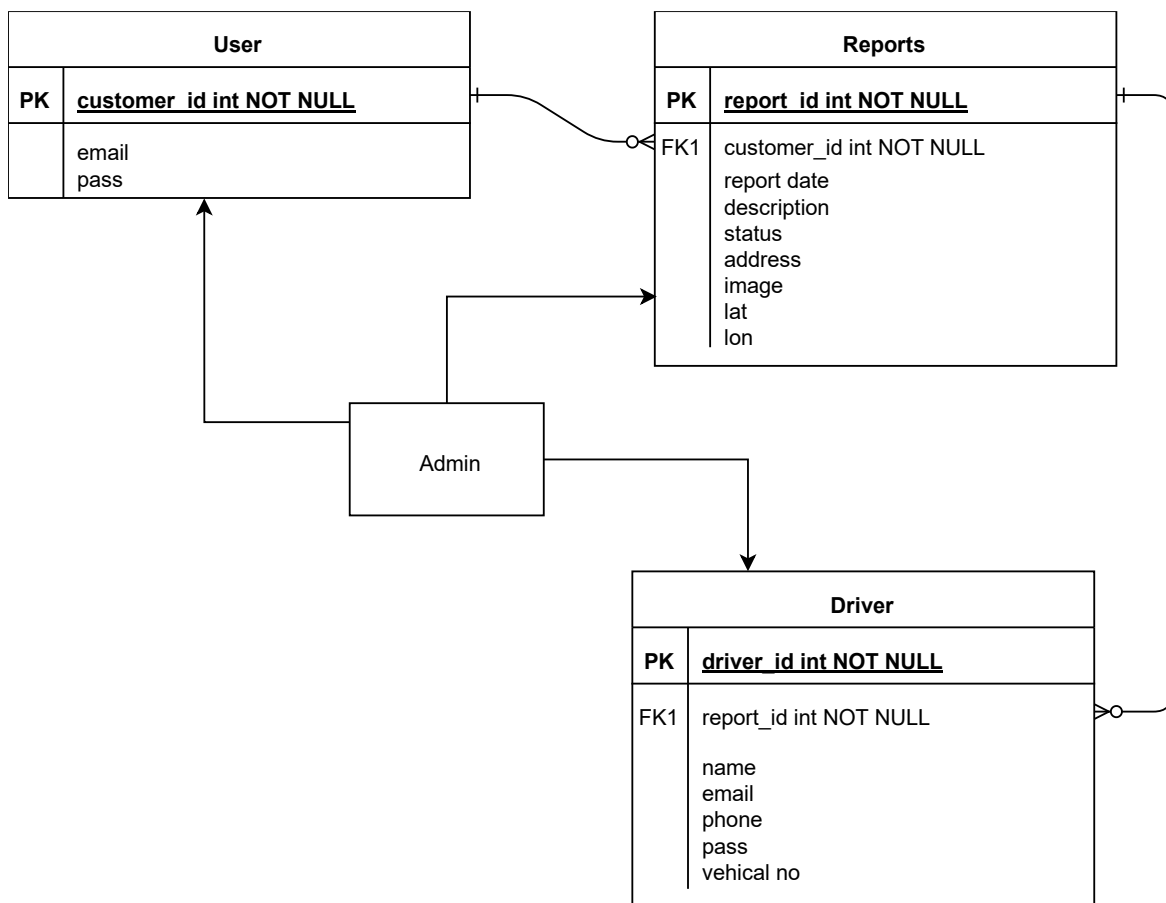
- Admin Registration and Authentication: Administrators can register accounts and securely log in to access administrative features.
- Dashboard: Administrators have access to a comprehensive dashboard for system overview and monitoring.



- User Management: Administrators can manage user accounts, roles, and permissions.
- Report Monitoring: Administrators can monitor and track all reported waste, including their status and resolution.
- Task Assignment: Administrators can assign waste collection tasks to drivers and track their completion.
- Analytics and Reporting: Administrators can generate reports and analytics on waste collection activities for evaluation and decision-making.

These modules work in tandem to create a seamless and efficient waste management system, facilitating communication, collaboration, and accountability among users, drivers, and administrators. Each module is tailored to meet the specific needs of its users, ensuring a user-friendly experience and optimal performance throughout the waste management process.

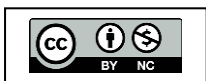
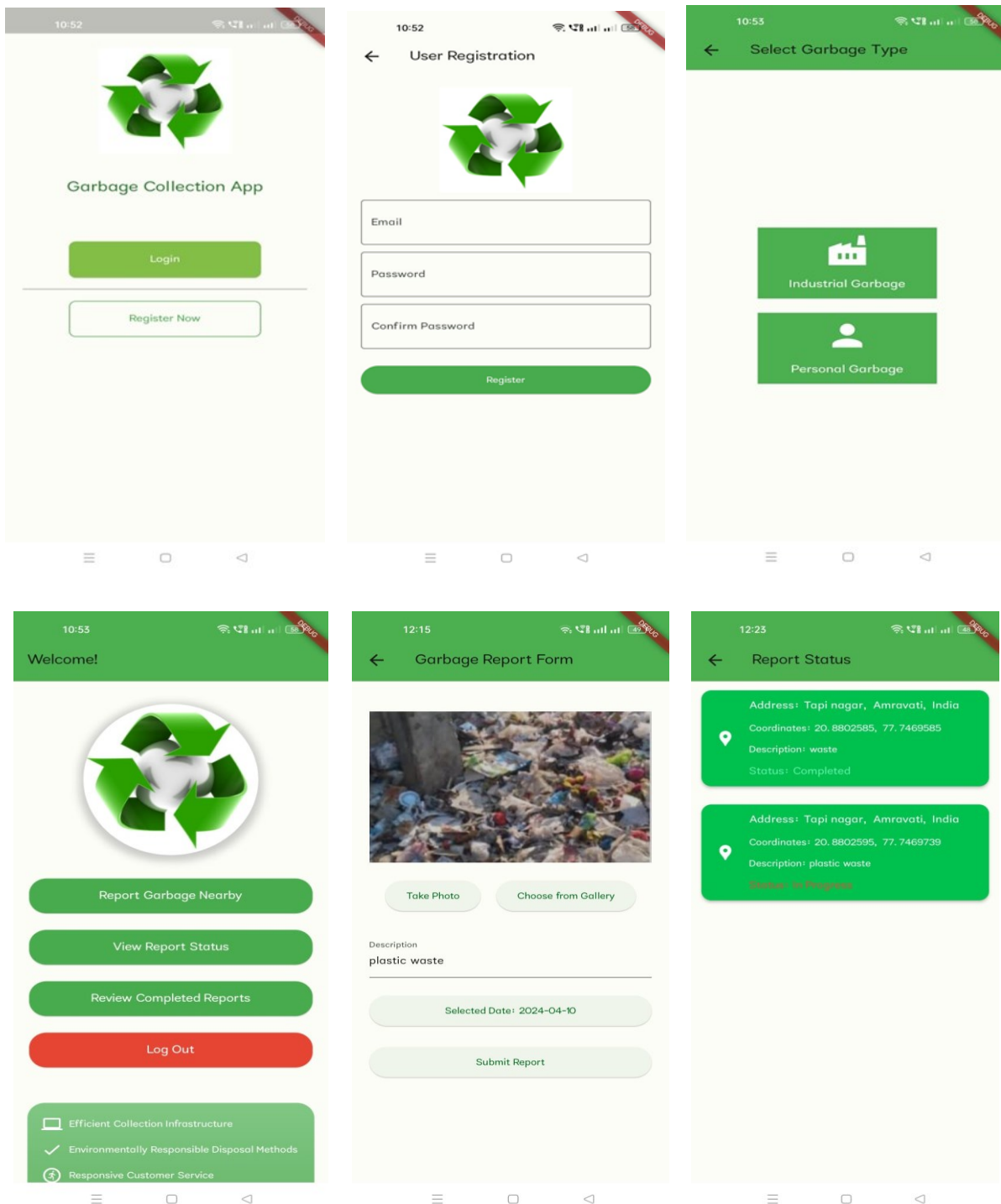
### V. ER DIAGRAM



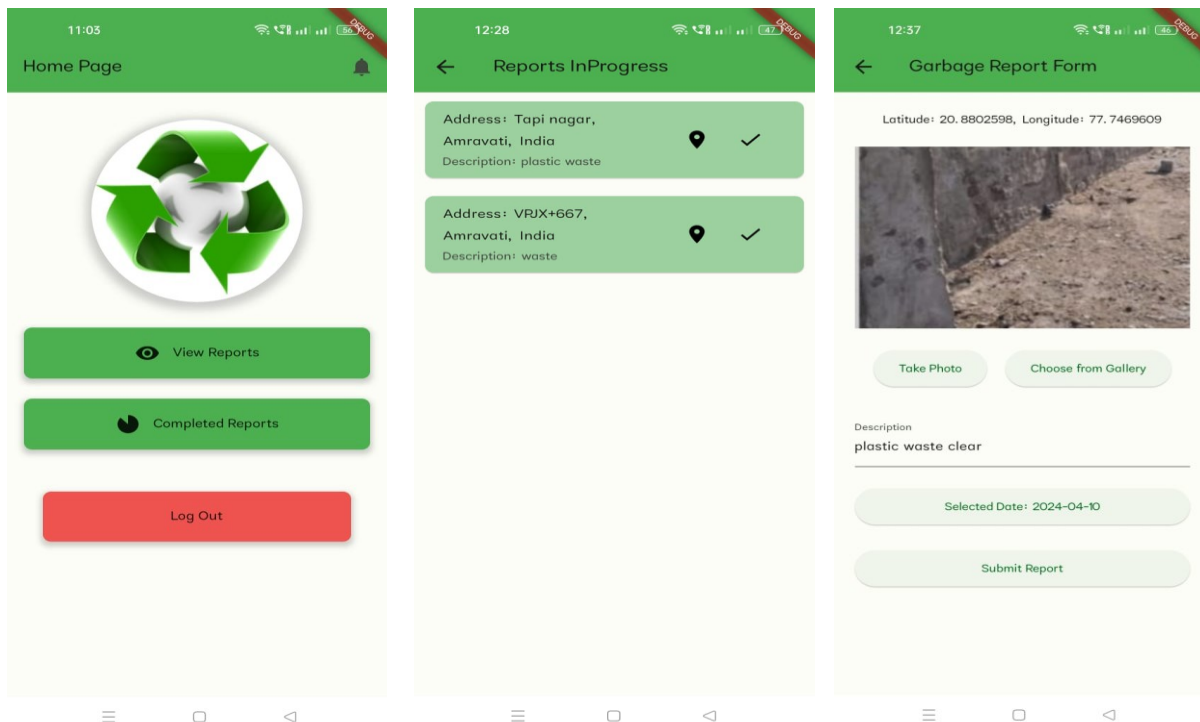
**VI. RESULT**

**A. Overview of Application**

**1. Users**

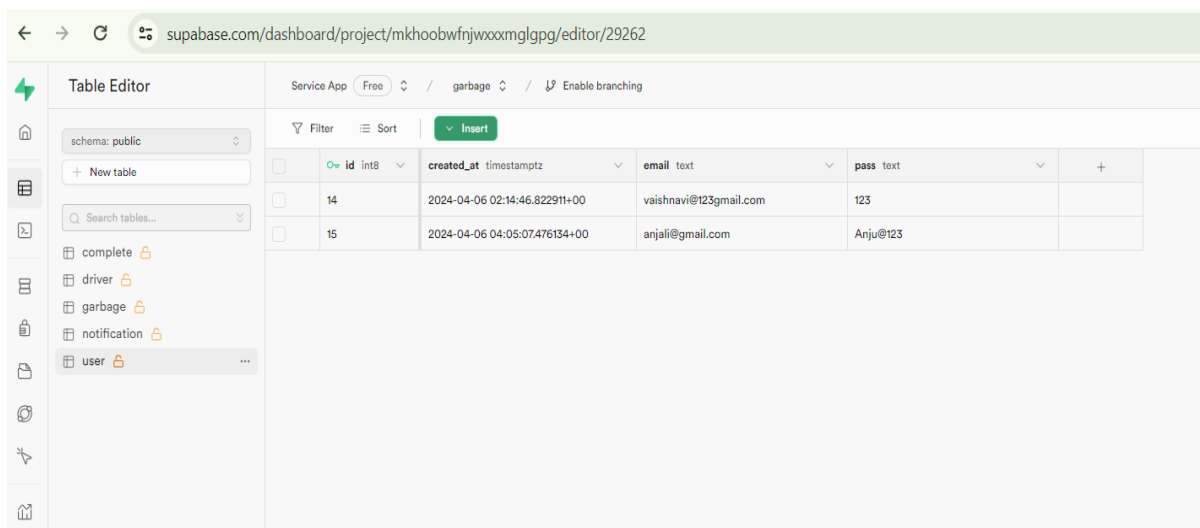


### 2. Drivers



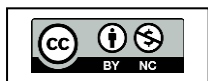
### B. Database

#### 1. Users Details



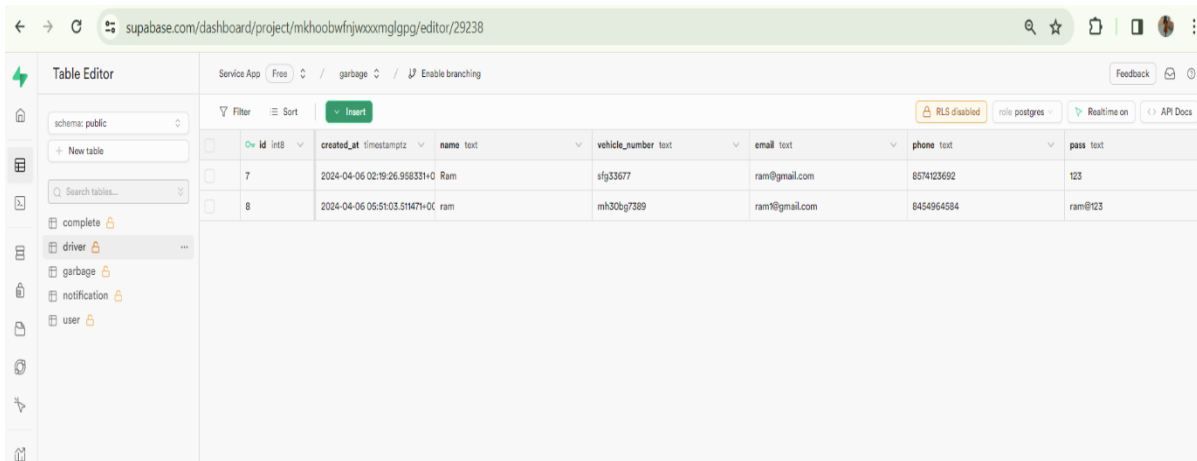
The screenshot shows the Supabase Table Editor interface for a table named 'garbage'. The table has the following columns: id, created\_at, email, and pass. Two rows of data are visible:

id	created_at	email	pass
14	2024-04-06 02:14:46.822911+00	vaishnavi@123gmail.com	123
15	2024-04-06 04:05:07.476134+00	anjali@gmail.com	Anju@123



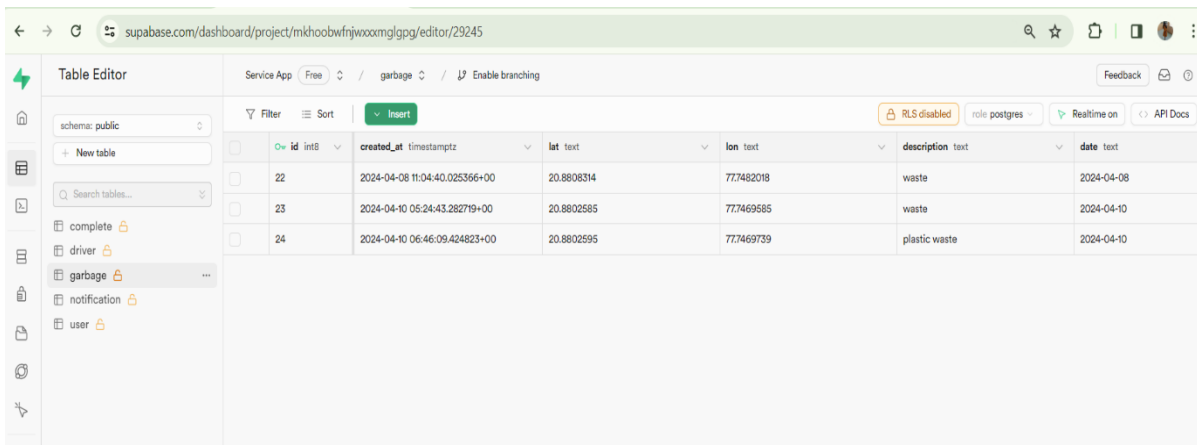


## 2. Driver Details

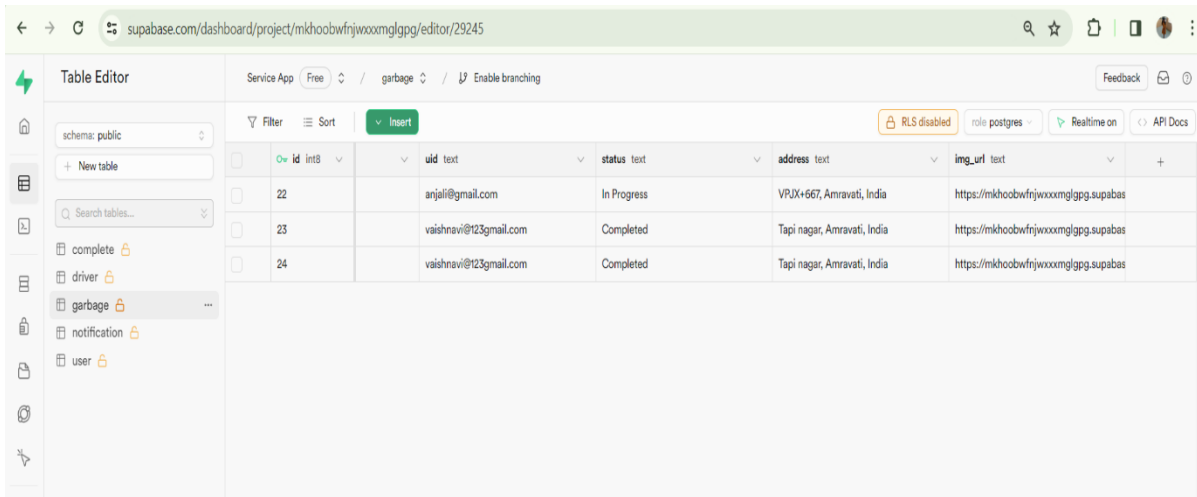


id	created_at	name	vehicle_number	email	phone	pass
7	2024-04-06 02:19:26.958331+0	Ram	sfg33677	ram@gmail.com	8574123692	123
8	2024-04-06 05:51:03.51471+0	ram	mh30bg7389	ram1@gmail.com	8454964584	ram@123

## 3. Garbage Complaints

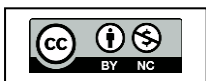


id	created_at	lat	lon	description	date
22	2024-04-08 11:04:40.025356+00	20.8808314	77.7482018	waste	2024-04-08
23	2024-04-10 05:24:43.282719+00	20.8802585	77.7469585	waste	2024-04-10
24	2024-04-10 06:46:09.424823+00	20.8802595	77.7469739	plastic waste	2024-04-10



id	uid	status	address	img_url
22	anjali@gmail.com	In Progress	VRUX+667, Amravati, India	https://mkhoobwfrjwxxmglpgg.supabas
23	vaishnavi@123gmail.com	Completed	Tapi nagar, Amravati, India	https://mkhoobwfrjwxxmglpgg.supabas
24	vaishnavi@123gmail.com	Completed	Tapi nagar, Amravati, India	https://mkhoobwfrjwxxmglpgg.supabas

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## VII. CONCLUSION

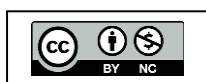
The Garbage Collection App represents a significant advancement in waste management technology, offering a comprehensive solution to address the challenges faced in waste collection and disposal. Through the integration of modern technologies, community engagement, and data-driven approaches, the app aims to revolutionize waste management practices and contribute towards building cleaner, healthier, and more sustainable communities.

The literature review highlights the importance of leveraging technology, community engagement, and real-time monitoring in improving waste management systems. Mobile applications, cloud-based solutions, and open-source technologies have emerged as key enablers for enhancing efficiency, transparency, and accountability in waste management operations. The Garbage Collection App builds upon these insights by providing a user-friendly platform for waste reporting, collection, and management, empowering users, drivers, and administrators to collaborate effectively towards a common goal of environmental conservation.

By enabling users to report waste incidents in real time, providing drivers with tools to efficiently manage waste collection tasks, and equipping administrators with comprehensive tools for system oversight and analytics generation, the Garbage Collection App facilitates seamless communication, coordination, and decision-making throughout the waste management process. The integration technologies such as Flutter Dart, Supabase, Google Maps API, and Firebase Cloud Messaging ensure a robust and scalable solution that meets the diverse needs of stakeholders involved in waste management efforts. In conclusion, the Garbage Collection App holds great promise for transforming waste management practices and fostering a culture of environmental stewardship. By harnessing the power of technology and community engagement, the app has the potential to make a positive impact on waste reduction, resource conservation, and public health, ultimately contributing towards a cleaner and more sustainable future for generations to come.

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