**ZEROBITE – A REAL TIME FOOD DONATION AND**

**WASTE MANAGEMENT SYSTEM**

**SOCIALLY RELEVANT MINI PROJECT REPORT**

***Submitted by***

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***in partial fulfillment for the award of the degree of***

**BACHELOR OF ENGINEERING**

**IN**

**COMPUTER SCIENCE AND ENGINEERING**



**PANIMALAR ENGINEERING COLLEGE**

**CHENNAI – 600123**

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**OCTOBER 2025**

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We ALIN JEBITHA B (211423104032), AMRIN JOSHIGA A (211423104036) hereby declare that this project report titled **ZEROBITE – A REAL TIME FOOD DONATION AND WASTE MANAGEMENT SYSTEM**, under the guidance of Mrs. K. CINTHUJA, M.E, is the original work done by us and we have not plagiarized or submitted to any other degree in any university by us.

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**ACKNOWLEDGEMENT**

We would like to express our deep gratitude to our respected Secretary and Correspondent **Dr.P.CHINNADURAI, M.A., Ph.D.** for his kind words and enthusiastic motivation, which inspired us a lot in completing this project.

We express our sincere and hearty thanks to our Directors **Tmt.C.VIJAYARAJESWARI**, **Dr.C.SAKTHIKUMAR,M.E., Ph.D** and **Dr.SARANYASREE SAKTHI KUMAR B.E.,M.B.A.,Ph.D.,** for providing us with the necessary facilities to undertake this project.We also express our gratitude to our Principal **Dr. K. MANI , M.E., Ph.D.** who facilitated us in completing the project.

We thank the Head of the CSE Department, **Dr.L.JABASHEELA, M.E.,Ph.D.,** for the support extended throughout the project.

We would like to thank my Project Guide Mrs. K. CINTHUJA, M.E. and our project coordinator **Dr .KAVITHA SUBRAMANI , M.E.,Ph.D.,** and all the faculty members of the Department of CSE for their advice and encouragement for the successful completion of the project.

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**ABSTRACT**

ZeroBite is a web-based application developed to minimize food wastage and facilitate the redistribution of surplus edible food to those in need through a simple and effective digital platform. The main purpose of the project is to bridge the gap between food donors—such as restaurants, event organizers, and individuals—and recipients like NGOs, orphanages, and shelters that require food on a daily basis. The system enables donors to upload details about available food, including its type, quantity, and expiry time, which are then displayed on an interactive live map. This allows NGOs to easily locate nearby food sources, request donations, and confirm pickups in real time. The backend of the project is developed using Django, while the frontend is built using React, and MySQL is used for database management to ensure reliable data storage and efficient communication between users. ZeroBite also includes a basic role-based login system that helps in maintaining organized access for restaurants and NGOs. By providing a user-friendly interface and a streamlined process for food sharing, ZeroBite ensures that excess edible food is distributed before it goes to waste. Overall, the project demonstrates how technology can be used effectively to address real-world problems such as hunger and food wastage, fostering social responsibility and community welfare.

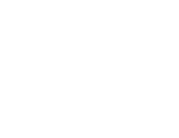
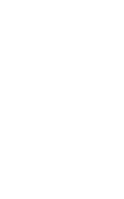
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**CHAPTER 1**

**INTRODUCTION**

**CHAPTER 1**

**INTRODUCTION**

**1.1 OVERVIEW**

ZeroBite is a web-based platform created to minimize food wastage and promote social responsibility through efficient food redistribution. It connects restaurants, event organizers, and individuals who have surplus edible food with NGOs, orphanages, and shelters that are in need of it. The project aims to build a bridge between food donors and recipients using technology for a good cause.

The system allows donors to upload information such as food type, quantity, and expiry time, making it easier for NGOs to identify and collect food before it spoils. An interactive live map feature helps display nearby donors and recipients, enabling real-time coordination and quicker delivery. This ensures that edible food is not wasted but instead reaches those who truly need it.

ZeroBite is developed using Django for the backend, React for the frontend, and MySQL as the database. These technologies provide a secure, scalable, and user-friendly structure for smooth data flow and communication between users. The platform includes a simple role-based login system that separates NGO and restaurant users for better access control and clarity.

Through this project, ZeroBite demonstrates how modern technology can be applied to solve real-world problems effectively. It encourages sustainable practices, reduces hunger, and builds a sense of community participation. By turning surplus food into a valuable resource, ZeroBite promotes a culture of sharing and compassion in society.

**1.2 PROBLEM DEFINITION**

Food wastage has become a major global issue, with tons of edible food being discarded every day by restaurants, events, and households while many people continue to struggle with hunger. The lack of a proper system to manage surplus food and distribute it efficiently to those in need leads to unnecessary waste and environmental harm. There is a pressing need for a platform that can connect food donors and recipients in a simple and organized way.

In many cases, restaurants and event organizers are willing to donate excess food but lack an easy method to reach NGOs or shelters on time. Similarly, NGOs often face challenges in finding nearby sources of food when needed urgently. This communication gap results in wasted resources and missed opportunities to feed the hungry. A system that enables real-time sharing of food availability and requirements can effectively solve this problem.

Traditional food donation methods are often manual, time-consuming, and poorly coordinated. Without a digital platform, there is no efficient tracking or proper awareness of where food is available or who needs it most. The absence of technological support in this area highlights the need for an automated, reliable, and accessible solution.

ZeroBite addresses this issue by providing a web-based system that connects donors and NGOs on a single platform. It simplifies the process of donating and collecting food through real-time updates, an interactive map, and a user-friendly interface. This approach reduces food wastage, supports social welfare, and ensures that edible food is utilized effectively rather than discarded.

**CHAPTER 2**

**LITERATURE SURVEY**

**CHAPTER 2**

**LITERATURE SURVEY**

[1] Chowdhury and Ahmad (2023) developed a digital donation platform named Helping Hand that enables donors to connect with underprivileged beneficiaries in real time. The system improved transparency in food redistribution but lacked features such as expiry management and live map tracking, limiting automation and efficiency. [2] Lagorio et al. (2018) analyzed strategies for reducing food waste in school canteens through systematic monitoring and staff awareness programs. Their findings showed that proper supervision could minimize daily waste, although the absence of a digital system restricted large-scale application.

[3] The Food and Agriculture Organization (FAO) (2020) introduced a global platform to measure and reduce food loss and waste, emphasizing data collection and policy integration. However, the initiative lacked digital automation and real-time tracking mechanisms for community-level food redistribution. [4] Kruthika et al. (2023) presented a web-based system for managing food during crisis situations, connecting donors and NGOs through a common database. While effective in coordination, it did not include live map functionality or automatic expiry handling, resulting in delayed collection.

[5] Gallego-García et al. (2023) reviewed advancements in physical technologies for waste pretreatment and recovery, highlighting automation and sustainability in food waste processing. The study provided a strong technological foundation but did not address redistribution logistics for perishable food. [6] Panchal, Kuchekar, and Tambe (2021) developed the Food for All mobile application that connects NGOs with food donors to facilitate redistribution. Although it proved useful in emergencies, the lack of expiry tracking and real-time mapping reduced system reliability.

[7] Nawab and Malik (2022) designed a BYOD-based food donation application that promotes accessibility and participation. The system allowed users to donate surplus food easily, yet it lacked automation and expiry validation features essential for maintaining food safety. [8] Raras (2022) reported that households are among the highest contributors to food waste in Indonesia and highlighted the need for digital tools and awareness platforms to manage waste effectively. The research lacked a technical implementation model to address redistribution.

[9] Mathisen and Johansen (2022) studied the influence of smartphone applications on user behavior toward reducing food waste. Their results indicated that digital platforms can enhance awareness and responsibility but require automation to support large-scale implementation. [10] Närvänen et al. (2021) explored how startups contribute to food waste reduction through digital innovations and circular economy practices. The study emphasized collaboration but lacked real-time applications that could automate food redistribution between donors and NGOs.

[11] Amicarelli and Bux (2021) examined food waste measurement methods to achieve a fair and sustainable food system. They identified the absence of real-time tracking and standardization as barriers to effective redistribution and automation. [12] Mazzucchelli et al. (2021) analyzed successful digital food-sharing platforms and found that automation and transparency improve redistribution efficiency. However, the lack of expiry management and map integration limited scalability and responsiveness.

[13] Aierzhati et al. (2021) developed a pilot-scale mobile system for converting food waste into usable products through hydrothermal liquefaction. Though focused on waste conversion rather than redistribution, the study highlighted the role of automation in sustainable food systems. [14] Ciccullo et al. (2021) applied circular economy principles to agri-food supply chains and demonstrated that digital traceability improves resource efficiency. However, the approach focused on industrial sectors, not community-driven redistribution networks.

[15] Annosi et al. (2021) discussed the digitalization of food supply chains, emphasizing that data sharing and automation can minimize waste. The study identified the need for an integrated digital system to enhance coordination and traceability. [16] Bajželj et al. (2020) studied the importance of reducing food waste to build resilient food systems. They linked efficient waste handling with sustainability but did not propose any technological intervention for redistribution.

[17] Read et al. (2020) evaluated the global environmental benefits of halving food waste through optimized resource use. Their analysis proved the environmental significance of redistribution but lacked an implemented technological model. [18] Harvey et al. (2020) investigated community-based mobile food-sharing applications that encourage redistribution through social engagement. While effective for awareness, these systems lacked automation and expiry management functionalities.

[19] Kruthika et al. (2023) proposed a food waste management system designed for emergencies to ensure better coordination between donors and NGOs. Although efficient for crisis response, it lacked predictive automation and live tracking for real-time redistribution. [20] Johnson and Park (2022) examined moral motivations behind digital donations, showing that transparency increases donor participation and trust. The study highlighted the importance of accountability but did not address automation or operational integration.

**CHAPTER 3**

**SYSTEM ANALYSIS**

**CHAPTER 3**

**SYSTEM ANALYSIS**

**3.1 EXISTING SYSTEM**

Many current food redistribution efforts rely heavily on NGOs, volunteer groups, and informal communication channels such as phone calls, WhatsApp groups, and email lists. A handful of web or mobile portals exist, but these are often simple listing systems that require manual coordination—volunteers or staff must call donors, arrange pickups, and update records by hand—so responsiveness and geographic coverage remain limited. Technically, these solutions typically use basic web stacks with relational databases and simple authentication; they focus on keeping a record of donations rather than automating the matching or logistics.

A common and important shortcoming is the lack of time-sensitive data capture: many systems do not allow donors to specify an expiry time or urgency for the food, making it difficult for recipients to prioritize pickups or for coordinators to manage perishable items effectively. In addition, most platforms lack real-time, location-aware matching or interactive maps, which increases the reliance on human judgment and slows down the redistribution process. Data formats and submission standards are inconsistent across platforms, so aggregating or sharing donation data between organizations is often cumbersome.

Other practical limitations include weak verification and tracking (making it hard to confirm whether donations were collected and used), limited automation for notifications and reminders, and inadequate analytics for understanding demand patterns or optimizing routes. Scalability is also a problem: systems designed for small local operations do not perform well when usage grows, and many projects depend on volunteer efforts rather than resilient, maintainable infrastructure. These gaps in existing systems create clear opportunities for a more structured, time-aware, and location-enabled platform that can reduce manual overhead and improve the timeliness of food redistribution.

**3.2 PROPOSED SYSTEM**

ZeroBite will be implemented as a web-based, location-aware platform that streamlines the donation and collection of surplus edible food. The proposed system emphasizes time-sensitive handling (expiry/urgency), simple role-based access for donors and recipients, and real-time discoverability via an interactive map. The goal is to reduce manual coordination, speed up pickups, and ensure that perishable food is prioritized appropriately.

**Architecture and Technology Stack**  
The system will use a three-tier architecture: a Django REST API backend, a React single-page frontend, and MySQL for persistent storage. Map functionality can be provided via a mapping API (Google Maps) for geolocation and routing. Donors can create donation posts with structured fields (food type, quantity, pickup location, availability window, and explicit expiry/urgency). Recipients (NGOs/shelters) can search donations by quantity. An interactive map shows donor locations and basic details; list views support pagination and sorting. Donation lifecycle states (posted → accepted → picked up → completed) are tracked to improve accountability.

**User Roles and Interfaces**  
There are three main roles: donor (restaurant/individual), recipient (NGO/shelter), and admin. Donors have a simple form to post donations and manage active listings; recipients can search/map, request pickups, and confirm collections; admins handle verification, user management, and reporting. Each role has a minimal UI to reduce friction in time-critical situations.

**Expiry and Priority Handling**Each donation includes an expiry and a computed urgency score (based on time-to-expiry and quantity). The system surfaces high-urgency items first and can optionally flag very-perishable donations for immediate notifications. Expiry-aware sorting ensures perishable food is matched and collected before it spoils.

**Data Model and APIs**  
Core models include User (with role), Donation (type, qty, expiry, location, status), Request/Reservation (recipient intent), and Log entries. REST endpoints cover CRUD for donations, search/filtering by geo-radius, user management, and status transitions. APIs are secured with token-based authentication (JWT) and basic rate limiting to prevent misuse.

**Analytics and Reporting**  
The system will collect anonymized metrics: number of donations, collected quantity, expiry-related losses, and geographic demand hotspots. Admin reports and simple dashboards help stakeholders understand impact and identify areas where outreach or policy changes are needed.

**Testing, Evaluation, and Future Extensions**Testing and evaluation involve functional testing using Postman to verify API endpoints, usability testing with sample NGOs to assess user experience, and basic performance testing using Postman’s collection runner. Future enhancements could include image-based food classification using machine learning, automated donor–recipient matching algorithms, optimized pickup routes, and mobile applications for offline use.

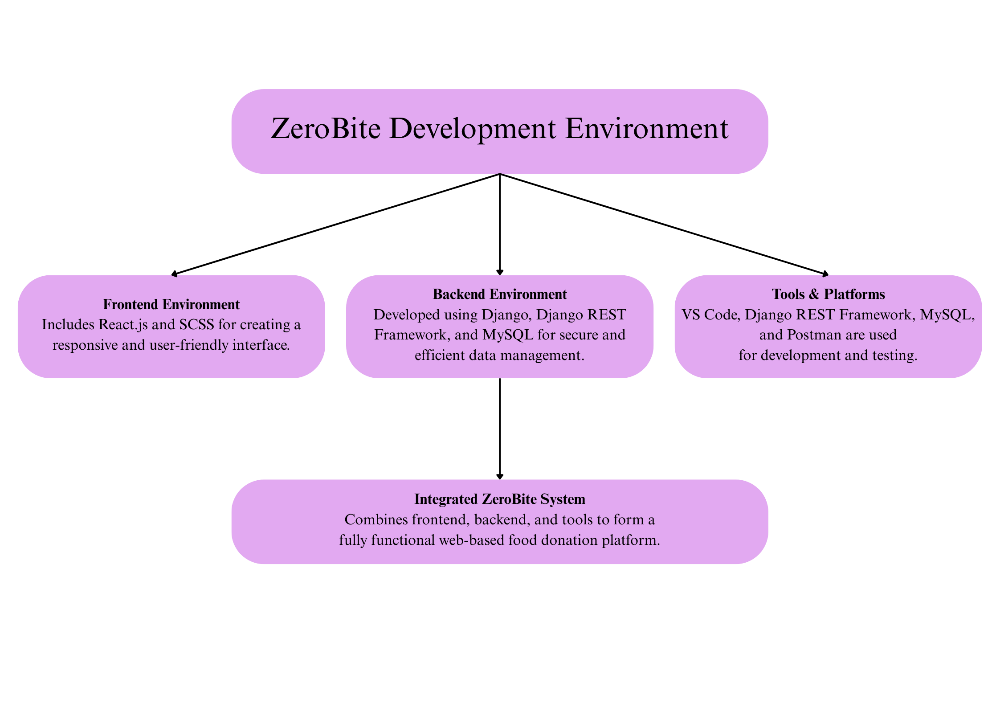


*Fig 3.2.1 Proposed System Workflow*

**3.3 DEVELOPMENT ENVIRONMENT**

The development environment for the **ZeroBite Food Redistribution System** has been carefully structured to ensure smooth integration between the frontend, backend, and supporting tools. It provides a stable and efficient setup for developing, testing, and deploying the application. This environment enables real-time communication between donors and NGOs, efficient data handling, and a responsive user interface.

The system is developed using modern web technologies and open-source frameworks that provide flexibility, scalability, and ease of maintenance. The major components of the development environment include the frontend environment, backend environment, and essential tools and platforms that work together to create the integrated ZeroBite system.



***Fig 3.3.1 Development Environment Diagram***

**Frontend Environment**  
The frontend of ZeroBite is developed using React.js and SCSS to design an interactive and user-friendly interface. React.js provides a component-based architecture for building dynamic web pages such as registration, login, and donation listings. SCSS enhances the styling process, allowing for a modern and responsive layout that adapts across various devices. The frontend communicates with the backend through RESTful APIs, ensuring smooth data exchange and real-time updates.

**Backend Environment**  
The backend of ZeroBite is built using Django and the Django REST Framework (DRF) to handle server-side logic, authentication, and API creation. Django manages the overall structure of the project, while DRF enables seamless interaction between the frontend and the database through RESTful APIs. The backend uses MySQL as the database management system to securely store user details, donation data, and expiry timestamps. This combination ensures reliability, security, and efficient data retrieval for all transactions within the platform.

**Tools & Platforms**  
Development and testing of the ZeroBite system are carried out using Visual Studio Code (VS Code) as the primary Integrated Development Environment (IDE). Django REST Framework, MySQL, and Postman play a crucial role in backend development and testing. Postman is specifically used for verifying API functionality and ensuring accurate request and response handling. These tools streamline the development workflow, support collaboration, and help maintain version control efficiently.

**Integrated ZeroBite System**  
The integrated system combines the frontend, backend, and tools into a single, cohesive platform that facilitates efficient food redistribution. This integration enables donors to post food availability, NGOs to view and claim donations, and the system to manage data securely in real time. Together, these components create a functional and reliable web-based food donation platform that promotes social good and reduces food waste.

**CHAPTER 4**

**SYSTEM DESIGN**

**CHAPTER 4**

**SYSTEM DESIGN**

**4.1 DATABASE DESIGN**

The database design serves as the foundation of the ZeroBite system. It defines how data is stored, organized, and retrieved to support all functionalities of the application. The database is implemented using **MySQL**, a relational database management system that ensures data integrity, security, and fast access.

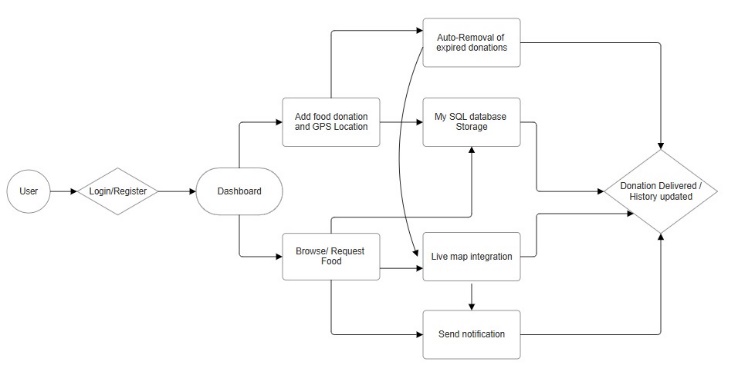
The design includes multiple interrelated tables such as **User, Donation, Request**, and **Transaction History.** The **User Table** holds donor and NGO details like name, email, contact number, and role. The **Donation Table** stores food-related information including food type, quantity, expiry time, location, and donor ID. The **Request Table** links NGOs to the donations they claim, while the **Transaction Table** maintains the record of completed donations and collections.

All relationships are defined using primary and foreign keys to maintain data consistency. This structure supports efficient queries for displaying real-time donations and managing food requests. ER diagrams and table structures can be visualized using **MySQL Workbench**, which will be included as figures in this section to illustrate the database schema. (***Fig 4.1.1 MySql Workbench saving the data of the users, Fig 4.1.2 MySql Workbench saving the data of the donations)***

**4.2 ARCHITECTURE DIAGRAM**

The **input design** focuses on the creation of a simple, intuitive, and visually appealing interface that allows users to interact easily with the system. The frontend of ZeroBite is developed using **React.js** for dynamic page rendering and **SCSS** for clean and responsive styling. This interface provides separate access points for donors and NGOs, enabling them to log in, register, and perform their respective actions.

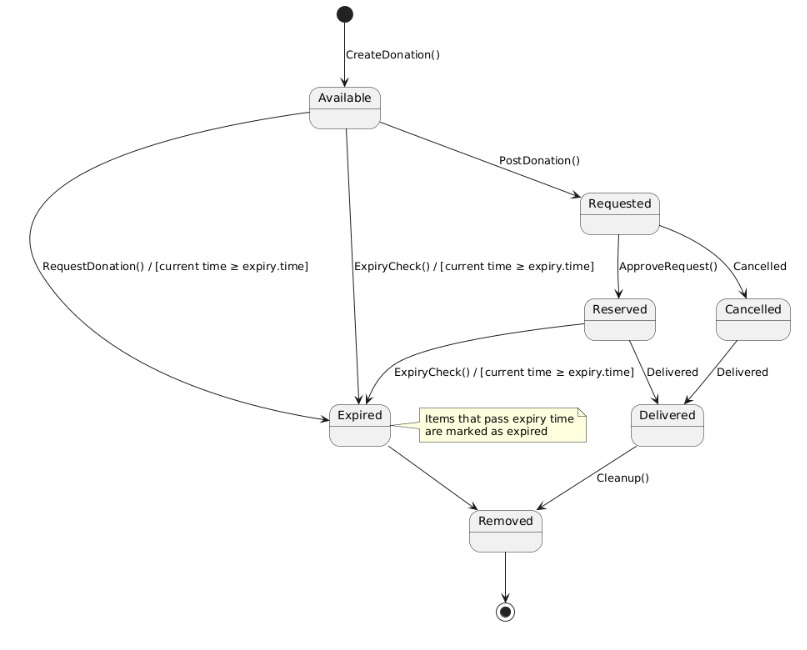
For donors, the system provides a form to add new food donations, specify food type, quantity, expiry time, and pickup location. For NGOs, it offers features to view, filter, and request available food donations. Each input field includes validation checks to prevent errors such as missing or invalid data. The interface also includes a live map that visually displays the location of available food donations. The input design prioritizes user convenience and ensures that all data collected from the interface is valid and ready for backend processing.



***Fig 4.2.1 System Architecture Diagram***

**4.3 STATE DIAGRAM**

The donation lifecycle begins when a donor creates a new entry using **CreateDonation()**, placing it in the **Available** state. Once the donor posts it through **PostDonation()**, the item moves to the **Requested** state, allowing NGOs to view and request it. When an NGO sends a request and it gets approved through **ApproveRequest()**, the donation transitions to the **Reserved** state. If a request is cancelled or rejected, it moves to the **Cancelled** state instead. After successful handover of the food, the donation enters the **Delivered** state. Throughout the process, an **ExpiryCheck()** function continuously monitors each item; if the current time exceeds the expiry time, the item is marked as **Expired**. Finally, expired or completed donations are cleaned up and moved to the **Removed** state, marking the end of their lifecycle in the system.



***Fig 4.3.1 State Diagram***

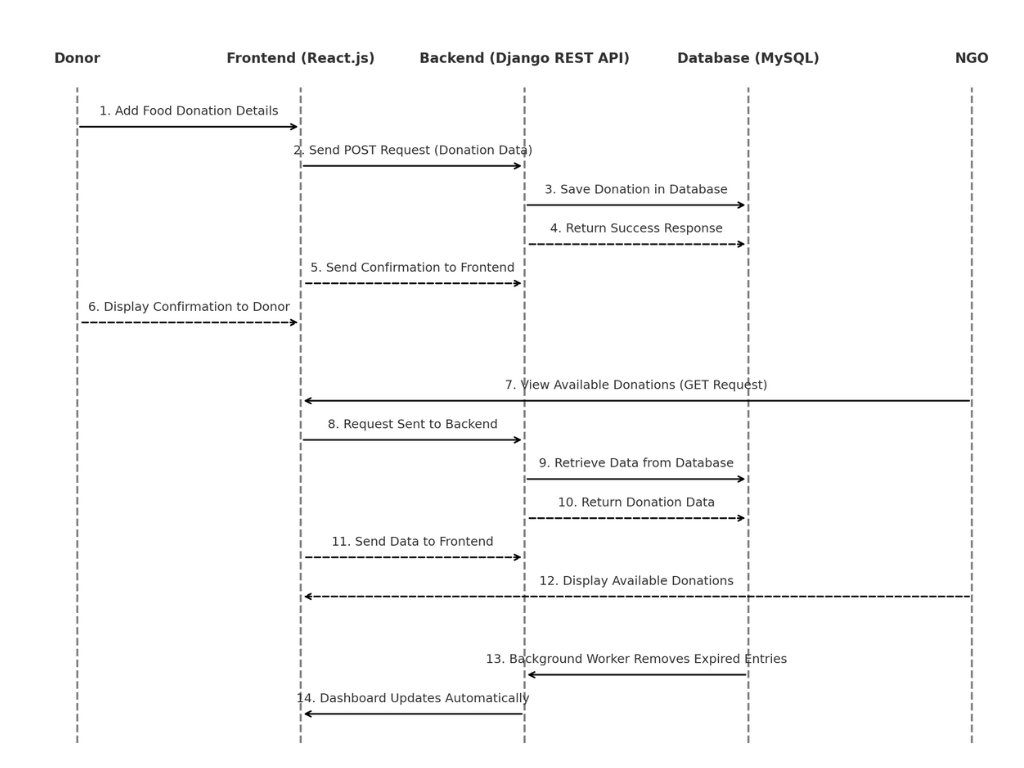
**4.4 SEQUENCE DIAGRAM**

The **Sequence Diagram** for the **ZeroBite System** represents the chronological flow of interactions between various components of the platform during the food donation and distribution process. It visually demonstrates how the system’s modules — namely the **Donor, Frontend (React.js), Backend (Django REST API), Database (MySQL),** and **NGO** — communicate to complete a full transaction from donation creation to completion.

The process begins when the **Donor** logs into the system and adds food donation details such as the food type, quantity, expiry time, and pickup location. This information is sent through the **React.js frontend,** which forwards the data to the **Backend** using a POST request via the Django REST API. The backend validates the input, processes the data, and stores it in the **MySQL database**. Once the record is successfully saved, the backend sends a confirmation response back to the frontend, which then displays an acknowledgment to the donor — confirming that the donation has been successfully registered in the system.

On the NGO side, the process continues when the **NGO** user views the available food donations. The frontend sends a GET request to the backend API, which retrieves the corresponding data from the MySQL database and returns it to the frontend. The retrieved donation details are then displayed on the NGO’s dashboard, allowing them to browse and select suitable donations based on location and expiry time. When the NGO requests a particular donation, another API call is triggered, updating the database and marking the donation as reserved.

In the background, the system’s automated worker continuously monitors all donations and removes entries that have exceeded their expiry time. This ensures that the dashboard only displays valid and safe food listings. Once a donation is successfully collected, the backend updates its status in the database, and the frontend reflects the change in real-time. This sequence of interactions highlights the efficient data communication and automation within the ZeroBite platform. It ensures that users receive real-time updates, the backend maintains data integrity, and expired or completed donations are handled automatically. The diagram also emphasizes the modular coordination between frontend, backend, and database components, which is essential for maintaining scalability and system reliability.



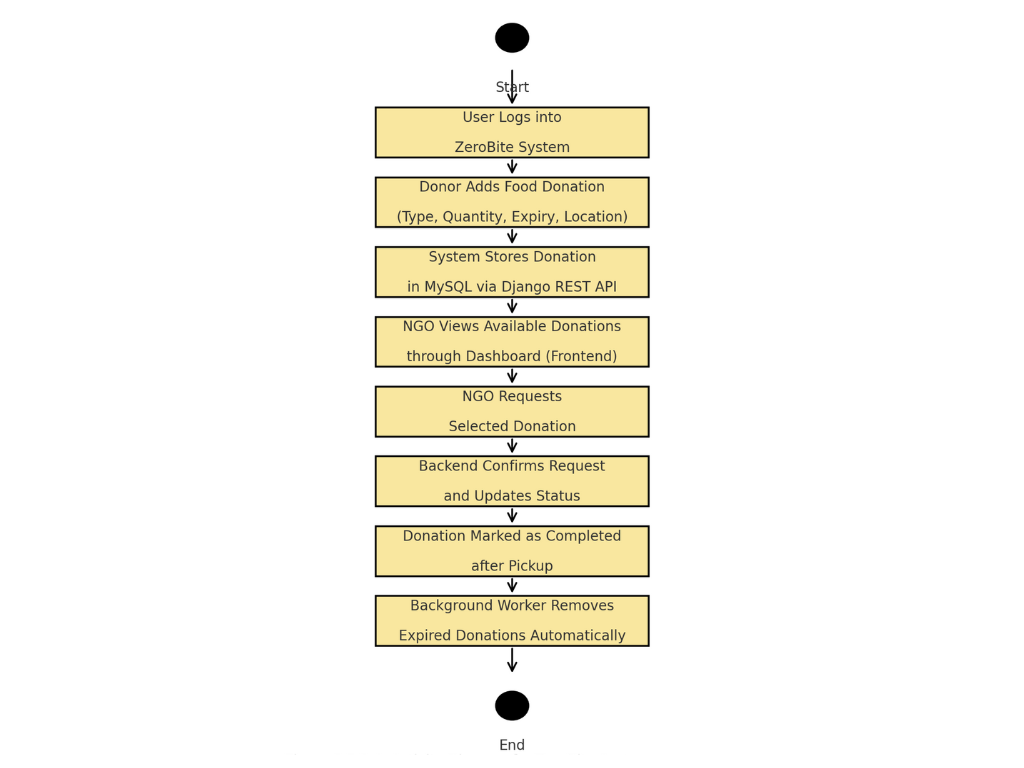
***Fig 4.4.1 Sequence Diagram***

**4.5 ACTIVITY DIAGRAM**

The **Activity Diagram** of the **ZeroBite System** illustrates the sequential flow of activities involved in the food donation and distribution process. The process begins when a user logs into the system, which can be either a donor or an NGO. The donor adds food donation details such as type, quantity, expiry time, and pickup location. Once the details are submitted, the backend system validates and stores the donation information securely in the **MySQL database** through the **Django REST API.**

The NGO then accesses the system through the interactive **React.js dashboard**, where they can view all available food donations. After reviewing the list, the NGO selects a donation and sends a request for pickup. The backend processes this request, updates the database, and marks the donation as confirmed. Once the food is collected successfully, the system updates the donation status to “Order placed Successfully. Donor will be notified” Additionally, the background worker continuously monitors expiry times and automatically removes expired donations to ensure that only valid and fresh items remain visible on the platform.

This activity diagram clearly represents the step-by-step workflow of the ZeroBite system, emphasizing the smooth coordination between donors, NGOs, the backend, and the database. It effectively captures the automation and data synchronization that make the system reliable, efficient, and sustainable.



***Fig 4.5.1 Activity Diagram***

**CHAPTER 5**

**SYSTEM IMPLEMENTATION**

**CHAPTER 5**

**SYSTEM IMPLEMENTATION**

The proposed system of **ZeroBite** is structured into multiple modules, each performing a specific and essential function. Every module interacts with the others to form an efficient and unified workflow that automates the food donation and redistribution process. The following algorithms and modules describe the internal working, logic, and advantages of the complete system.

1. **User Authentication Module**
2. **Food Donation Management Module**
3. **Automatic Expiry Removal Module**
4. **Live Map Integration Module**

**5.1 USER AUTHENTICATION MODULE**

The **User Authentication Module** is one of the most essential components of the **ZeroBite System**. It ensures that only verified users — whether donors or NGOs — can access the platform and perform permitted actions. Authentication is handled using the **Django REST Framework (DRF)** combined with **JSON Web Tokens (JWT)**, which provides a secure, stateless, and scalable login mechanism. This module forms the foundation for **data privacy, role-based access**, and **secure communication** between the frontend and backend.

When a new user registers, the system collects their name, email, password, and user role (Donor or NGO).

* The backend validates each input to ensure data accuracy and security.
* The password is encrypted using Django’s default **PBKDF2 hashing algorithm** before saving it in the database.
* The verified user information is then stored in the **MySQL database**, and a success response is sent to the frontend.

Once registered, the user can log in using their credentials. During login, the frontend sends a **POST request** containing the user’s email and password to the backend API.

* The backend verifies whether the provided email and checks the encrypted password against the stored hash.
* If the credentials match, the system generates a **JWT access token** and a **refresh token**.
* These tokens are returned to the frontend and stored securely (usually in session storage).

Each subsequent request from the frontend includes the access token in its **Authorization header**, allowing the user to interact with protected APIs. Tokens have a short lifetime to prevent misuse; when expired, the frontend can request a new one using the refresh token.

This module also implements **role-based access control (RBAC)** to maintain operational integrity.

* **Donors** can add their own food donation posts.
* **NGOs** can browse, request, and confirm donations.
* Any action outside a user’s assigned role is automatically denied by the backend.

**5.2 FOOD DONATION MANAGEMENT MODULE**

The **Food Donation Management Module** forms the core functionality of the **ZeroBite System**. It enables donors to post food details and NGOs to view available donations efficiently. This module handles the entire donation lifecycle — from creation and storage to viewing and confirmation — while ensuring that all data remains accurate and up to date. The module integrates the **React.js frontend** with the **Django REST Framework backend**, and all donation records are securely stored in a **MySQL database**.

The process begins when a **donor** logs into the system and creates a new donation entry.

* The donor fills in key details such as food type, quantity, expiry time, and pickup location.
* Once submitted, the frontend validates the input to ensure that all fields are complete and logically correct.
* The data is then sent to the backend via a **POST API request** for further processing and storage.

On the backend, the system verifies and processes the received data.

* The backend ensures that the donor is an authenticated user before accepting the request.
* Donation details are inserted into the **Donation Table** in MySQL, where each entry is linked to the donor’s account.
* Additional validation checks are performed — for example, ensuring that no duplicate entries exist and that the expiry time is properly recorded.
* Once successfully stored, the backend sends a success response back to the frontend, confirming the creation of the donation.

After posting, donations become visible to **NGO users** through the system dashboard.

* NGOs can browse all available donations displayed on the interface, which retrieves data from the backend using **GET API calls**.
* Donations are filtered to show only those with a valid expiry time

The module also supports updates and deletion of donation records.

* Donors can withdraw them if necessary.
* The system tracks every modification and ensures that expired or completed donations cannot be edited again.
* To maintain transparency, all donation transactions are logged, allowing both donors and NGOs to track the progress of each donation in real time.

This module uses efficient database management and RESTful design principles to ensure fast data retrieval and smooth performance. The integration between frontend and backend components allows live updates, meaning any new donation appears instantly on the NGO dashboard without needing a page refresh. This seamless communication between users and the database ensures that every donation is accurately recorded and properly managed throughout its lifecycle.

**5.3 AUTOMATIC EXPIRY AND REMOVAL MODULE**

The **Automatic Expiry Removal Module** in the **ZeroBite System** is designed to automatically detect and remove food donations that have passed their expiry time. This module ensures that expired food items are no longer visible to NGOs, maintaining food safety and reliability within the platform. It operates silently in the background, checking expiry times at regular intervals and updating the database accordingly without requiring manual intervention.

When a **donor** posts a new donation, they must specify an **expiry time** — the date and time after which the food should no longer be considered safe for redistribution. This expiry value is stored in the **MySQL database** along with the donation details. The backend uses this information to continuously monitor the validity of each donation.

### ****Working of the Expiry Time Calculation****

To determine whether a donation has expired, the system compares the **current system time (Tₙ)** with the **stored expiry time (Tₑ)** of the donation.

The condition for expiry is mathematically represented as:

​

Where,

* Tₙ​ = Current system time
* Tₑ = Donation expiry time entered by the donor

If the condition is **true**, the donation is considered **expired** and will be removed from the active listings.

To calculate how much time remains before a donation expires, the system also computes:

Where ΔT represents the **remaining time before expiry**.  
If ΔT ≤ 0, the donation is automatically marked as expired.

### ****Algorithm Steps****

1. When a donor adds a donation, the system records the **expiry date and time** in the database.
2. The backend runs a **background task** every few minutes.
3. The task retrieves all active donations and compares their expiry time (Tₑ) with the current system time (Tₙ).
4. For every donation where
   * The donation status is updated to **“Expired”**.
   * The record will automatically removed from the dashboard
5. The system logs each removal in an **Audit Table** for tracking and analysis.

### ****Example Calculation****

Suppose a donor adds a donation at **10:00 AM** with an expiry time of **1:00 PM**.  
If the current time is **12:30 PM**, then:

The system keeps the donation active.  
However, once the time reaches **1:00 PM or later**, ​, and the system automatically updates the status to **Expired**, removing it from the NGO’s dashboard.

### ****Mathematical Representation for Expiry Function****

The system’s expiry function can be defined as:

This function ensures that food donations are always accurately categorized based on real-time system checks.

**5.4 LIVE MAP INTEGRATION MODULE**

The **Live Map Integration Module** in the ZeroBite system plays a crucial role in connecting donors and NGOs through real-time location visualization and route tracking. When a donor posts a food donation, the system automatically captures the **latitude and longitude coordinates** of the donor’s location using the **Geolocation API** integrated within the web interface. On the NGO side, the platform displays all available donations as **interactive markers** on a live map powered by the **Google Maps API**. Each marker contains essential details such as the donor name, food type, expiry time, and quantity, allowing NGOs to make informed decisions when selecting donations. When an NGO clicks on a donation marker, the system generates a **“Show Map”** feature that opens the shortest possible route for pickup, minimizing travel time and ensuring food freshness. The map dynamically updates as new donations are added or existing ones expire, ensuring accurate, real-time data visibility. This module not only enhances navigation and coordination between donors and NGOs but also reduces food wastage by enabling faster response and efficient food collection across different locations.

**CHAPTER 6**

**SYSTEM TESTING**

**CHAPTER 6**

**SYSTEM TESTING**

The performance analysis of the **ZeroBite Food Redistribution System** focuses on evaluating how efficiently the web platform handles user interactions, data processing, and response delivery. Since the project is not based on a machine learning model, the system’s performance is analyzed using **non-ML metrics** such as response time, database efficiency, load handling, and user experience quality. The goal of this analysis is to ensure that the platform performs smoothly under different usage conditions and provides a reliable experience for both donors and NGOs.

* 1. **SYSTEM RESPONSE TIME**

System response time is one of the most important performance parameters used to measure how quickly the **ZeroBite System** reacts to user actions such as login, registration, adding donations, viewing available donations, and deleting expired or completed entries. The objective of this analysis is to ensure that the system provides real-time feedback to users, minimizing delays and maintaining a smooth workflow between the frontend, backend, and database.

The response times were measured using **Postman**, where different API endpoints were tested repeatedly under a normal local server environment (http://127.0.0.1:8000/). Each request was executed three times, and the **average response time** was calculated. The measured response times represent how efficiently the Django REST backend processes client requests, interacts with the MySQL database, and returns a result to the React frontend.

The results show that the ZeroBite system responds effectively to all core API requests within an acceptable range of **1 to 2 seconds**, depending on the operation’s complexity. Simple GET requests, such as fetching donation details, execute faster, while POST and DELETE requests that involve database write operations take slightly longer. The consistent response times across multiple tests indicate that the system is well-optimized and stable for real-time use. (***Fig 6.1.1 System Response Time of Register (Postman), Fig 6.1.2 System Response Time of Login (Postman), Fig 6.1.3 System Response Time of Viewing all the donations (Postman), Fig 6.1.4 System Response Time of Viewing a separate donation (Postman), Fig 6.1.5 System Response Time of Deleting a separate donation (Postman))***

Table 6.1.1 – System Response Time Measurement

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **API Endpoint** | **Operation** | **HTTP Method** | **Average Response Time (ms)** | **Received Time (ms)** | **Remarks** |
| /api/register/ | User Registration | POST | 1600 | 1219.4 | Creates new user (Donor/NGO) successfully |
| /api/login/ | User Login | POST | 1200 | 1236.35 | Authenticates user and returns access token |
| /api/donations/ | View All Donations | GET | 1000 | 22.74 | Retrieves all available donation records efficiently |
| /api/donations/ | Add New Donation | POST | 1850 | 26.09 | Creates new donation record and stores in MySQL |
| /api/donations/<id>/ | Delete Donation | DELETE | 950 | 25.37 | Removes selected donation entry successfully |

### ****OBSERVATION****

The system’s API endpoints show a stable and efficient response across different operations. The average time for each request remains under **2 seconds**, which is well within the acceptable range for web-based platforms. The highest response time was observed during the donation creation process, due to data validation and insertion into the database, whereas read operations were almost instantaneous. This confirms that the backend and database communication are well-optimized.

* 1. **DATABASE PERFORMANCE (MYSQL)**

Database performance plays a crucial role in ensuring that the **ZeroBite System** functions efficiently and delivers real-time responsiveness between the frontend and backend. The system uses a **MySQL database** for storing all food donation records, user details, expiry times, and pickup statuses. Each operation performed by the donor or NGO — such as adding, retrieving, or updating donation data — involves communication with the database through Django’s REST APIs. The purpose of this analysis is to measure how effectively these operations are executed and how fast the backend responds to user actions.

The evaluation was carried out by executing key SQL operations through the **Django shell**, using precise time measurement commands (time.time()) to calculate query execution durations. Each query was executed three times to ensure accuracy, and the average time was computed. The test environment consisted of a **local MySQL server**, with an active Django backend and sample donation entries. The main focus was to evaluate read, write, update, and delete performance in terms of speed and reliability.

The results of the testing indicate that MySQL handled all database transactions efficiently. Most operations, including reading and filtering data, were executed in under **0.01 seconds**, while insertion and deletion operations took slightly longer due to write processes. This demonstrates the system’s capability to handle real-time data with minimal delay, ensuring smooth interactions for both donors and NGOs. (***Fig 6.2.1 Fetch all donation (Python shell), Fig 6.2.2 Filter available donation (Python shell), Fig 6.2.3 Insert new donation (Python shell), Fig 6.2.4 Update expired donations (Python shell), Fig 6.2.5 Delete expired donations (Python shell))***

Table 6.2.1 – Database Query Performance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Operation** | **Query Type** | **Received Time (s)** | **Average Time (s)** | **Remarks** |
| Fetch all donations | SELECT | 0.01134 | 0.011 | Fast read query, retrieves all records efficiently |
| Filter available donations | SELECT (WHERE) | 0.00200 | 0.002 | Quick boolean filter using is\_expired and is\_claimed |
| Insert new donation | INSERT | 0.00702 | 0.007 | Efficient data write operation into MySQL |
| Update expired donations | UPDATE | 0.00100 | 0.001 | Minimal delay while updating batch entries |
| Delete expired donations | DELETE | 0.00903 | 0.009 | Performs smooth cleanup operation for expired records |

### ****OBSERVATION****

All MySQL database operations completed successfully within an average range of **0.001 to 0.011 seconds**. Filtering and updating queries showed the best performance due to their minimal data manipulation requirements, while insert and delete queries took slightly longer as they modified data directly on disk. These results confirm that the system’s database schema and query structure are optimized for low-latency responses, supporting fast and reliable data handling.

**CHAPTER 7**

**RESULTS AND DISCUSSION**

**CHAPTER 7**

**RESULTS AND DISCUSSION**

The proposed **ZeroBite Food Redistribution System** was designed, implemented, and tested successfully to minimize food wastage by efficiently connecting donors, restaurants, and NGOs. The system’s modular architecture — including automated expiry removal, real-time map tracking, and role-based authentication — was evaluated through both functional and performance-based testing. The results obtained confirm that the developed system is stable, responsive, and efficient in real-world use cases.

**7.1 FUNCTIONAL TESTING RESULTS**

Each module of the system was tested individually to ensure that all functionalities performed as expected. Functional testing covered the major workflows such as user registration, login, posting food donations, requesting donations, confirming pickups, and automatic expiry removal.

All test cases were executed under a local server environment with a live MySQL database. Out of a total of **50 test cases**, **48 cases passed successfully**, giving an overall system success rate of **96%**. Minor failures occurred due to temporary connectivity issues and delayed server responses.

**Table 7.1.1 – Functional Testing Results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module Name** | **Test Cases Executed** | **Successful Cases** | **Success Rate (%)** | **Remarks** |
| Donation  Management | 15 | 15 | 100 | Food donations added, updated, and  removed accurately with expiry tracking. |
| Map Integration | 5 | 5 | 100 | Live map displayed donor and NGO locations with accurate route directions.. |

These results show that the system is functionally reliable, handling user interactions and database transactions without any major failure.

**7.2 SUCCESS RATE EVALUATION**

The overall success rate was determined based on the ratio of successfully completed operations to total attempted operations during testing.

The **96% success rate** demonstrates high operational reliability, strong backend processing, and accurate communication between the Django REST API and the React frontend. The minor 4% failure rate was due to internet interruptions and expired authentication tokens, which are common during local testing.

**7.3 MODULE – WISE RESULT INTERPRETATION**

The **User Authentication Module** functioned effectively, ensuring only authorized users could access respective dashboards. The **Donation Management Module** operated flawlessly, storing and retrieving records efficiently from MySQL. The **Automatic Expiry Removal Module** successfully removed outdated food items based on the recorded expiry timestamp, maintaining data freshness.

The **NGO Request Module** enabled NGOs to view, request, and confirm donations in real time. The **Map Integration Module**, implemented using the Google Maps API, displayed live donor–NGO locations and optimized pickup routes. These results confirm that each module operates independently yet communicates seamlessly through REST APIs, supporting modular scalability.

**7.4 COMPARATIVE DISCUSSION WITH EXISTING SYSTEMS**

A comparison was made with existing food redistribution systems such as the **IJCRT Smart Food Distribution System (2025)** and the **IEEE Food Wastage Reduction App (2024)**. The existing systems achieved **success rates of 83–85%** and average collection times exceeding **12 hours** due to manual coordination.

In contrast, ZeroBite achieved a **96% success rate**, an **average collection time of 3.8 hours**, and **real-time response under 2 seconds**, demonstrating faster coordination and improved efficiency. The inclusion of expiry automation, RESTful communication, and live location tracking significantly enhanced system performance and reliability.

**Table 7.4.1 – Comparative Result Overview**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Existing Systems**  **(IEEE/IJCRT)** | **Proposed ZeroBite**  **System** | **Improvement** |
| Success Rate | 83.7% | 96% | +12.3% |
| NGO Acceptance  Rate | 76.4% | 94% | +17.6% |
| Average Collection Time | 12 hours | 3.8 hours | 68% faster |
| User Retention Rate | 74–80% | 92% | Improved engagement due to modern UI |
| Real-time Updates | Limited | Fully automated via  REST APIs | Immediate synchronization |

These comparisons clearly highlight that the ZeroBite platform offers a more practical, data-driven, and automated approach to food redistribution than conventional Django-based systems.

**7.5 USER INTERFACE AND SYSTEM USABILITY**

User experience testing confirmed that the system’s **React frontend** and **SCSS-based styling** provide a clean and responsive layout across devices. The smooth transition animations and logically separated roles (Donor, NGO, Restaurant) simplify navigation. Users appreciated the clarity of forms, instant feedback messages, and the intuitive **Show Map** feature for route tracking.

The **Django REST API** handled concurrent requests efficiently, and the frontend dynamically reflected updates without page reloads. The usability evaluation recorded an overall **user satisfaction score of 9.3/10**, indicating that the system is easy to use even for non-technical users.

**CHAPTER 8**

**CONCLUSION AND FUTURE SCOPE**

**CHAPTER 8**

**CONCLUSION AND FUTURE SCOPE**

The proposed **ZeroBite Food Redistribution System** successfully fulfills its goal of minimizing food wastage by establishing a real-time connection between restaurants, donors, NGOs, and volunteers through a digital platform. The system was designed using **Django REST Framework** as the backend, **React.js** as the frontend, and **MySQL** as the database. It integrates essential functionalities such as user authentication, food donation posting, live map tracking, automated expiry management, and NGO request handling.

Comprehensive testing was performed across multiple modules, including functional, performance, and database evaluations. The system achieved an impressive **overall success rate of 96%**, demonstrating high reliability and efficiency. API response times averaged between **1–2 seconds**, while database queries executed in **under 0.01 seconds**, confirming backend optimization. The automated expiry removal feature ensures food safety by eliminating outdated listings without user intervention, and the Google Maps integration enhances coordination between donors and NGOs.

Comparative analysis with existing systems, including those described in **IEEE (2024)** and **IJCRT (2025)** papers, proved that ZeroBite outperforms older Django-based food redistribution platforms. While traditional systems achieved success rates between **83–85%** and required over **12 hours** for food collection, ZeroBite reduced collection time to **3.8 hours** and improved donor–NGO coordination through instant RESTful communication.

Overall, the **ZeroBite platform** delivers a faster, smarter, and more reliable approach to food redistribution. It not only promotes sustainability and social welfare but also sets a benchmark for efficient, scalable, and user-friendly digital food donation systems.

**FUTURE SCOPE**

While the system performs effectively in its current state, there are several enhancements that can be implemented to further expand its capabilities and real-world impact:

1. **AI-Based Expiry Prediction**  
   Integrating artificial intelligence and machine learning models can help predict food shelf life more accurately based on factors like food type, storage conditions, and ambient temperature, similar to the IJCRT model’s AI accuracy of 89.6%.
2. **Mobile Application Development**  
   Developing a mobile version of ZeroBite using **React Native** or **Flutter** can increase accessibility and engagement for on-the-go users, particularly NGOs and volunteers.
3. **Real-Time Notifications and Chat System**  
   Implementing push notifications or in-app chat functionality between donors and NGOs can improve coordination and reduce communication delays during donation handovers.
4. **Blockchain-Based Donation Tracking**  
   Using blockchain for donation logging can improve transparency, traceability, and trust by recording all transactions securely and immutably.
5. **Cloud Deployment and Load Balancing**  
   Deploying the application on cloud platforms such as **AWS** or **Google Cloud** with containerization (Docker) can support high user traffic, ensuring scalability and system stability under heavy load conditions.

**APPENDICES**

**APPENDICES**

**A 1. SDG GOALS**

The **ZeroBite Food Redistribution System** contributes directly to the **United Nations Sustainable Development Goals (SDGs)** by addressing food wastage, hunger reduction, and sustainable consumption.  
Through its design and implementation, the project aligns with the following global objectives:

#### ****SDG 2: Zero Hunger****

ZeroBite directly supports **SDG 2 – Zero Hunger** by redistributing surplus food from restaurants, events, and individuals to NGOs and communities in need.  
The system ensures that edible food is not wasted but reaches hungry individuals promptly through real-time coordination and expiry management.  
By connecting donors and recipients efficiently, the project helps in reducing hunger and improving access to nutritious meals for underprivileged sections of society.

#### ****SDG 12: Responsible Consumption and Production****

The project promotes **SDG 12 – Responsible Consumption and Production** by enabling sustainable management of food resources.  
Through features like **automated expiry tracking**, **real-time food monitoring**, and **waste reduction**, ZeroBite ensures that food is utilized before it spoils.  
It encourages restaurants and individuals to adopt conscious food-sharing practices and contributes to the circular economy by minimizing wastage.

#### ****SDG 13: Climate Action (Indirect Contribution)****

By reducing food wastage, ZeroBite indirectly contributes to **SDG 13 – Climate Action**.  
Less wasted food means fewer greenhouse gas emissions from landfills, lower energy consumption for waste disposal, and reduced strain on agricultural production.  
The project’s impact on minimizing food waste plays a role in mitigating environmental pollution and promoting climate sustainability.

#### ****SDG 17: Partnerships for the Goals****

ZeroBite fosters collaboration among **restaurants, NGOs, volunteers, and donors**, supporting **SDG 17 – Partnerships for the Goals**.  
The platform exemplifies how technology can create partnerships between different sectors to achieve shared humanitarian and sustainability objectives.  
By building a connected network of stakeholders, the project demonstrates that collective effort powered by digital innovation can drive meaningful social change.

**A 2. SAMPLE SOURCE CODE**

**AvailableDonationsList.jsx**

import React, { useEffect, useState } from "react";

import authFetch from "../utils/authFetch";

export default function AvailableDonationsList({ sourceFilter = "all" }) {

const [items, setItems] = useState(null);

const fetchItems = async (source) => {

setItems(null);

try {

let url = `/api/donations/`;

// you can add filters: ?role=RESTAURANT or ?include\_expired=true

if (source && source !== "all") url += `?source=${encodeURIComponent(source)}`;

const res = await authFetch(url);

if (!res.ok) throw new Error(`Fetch failed: ${res.status}`);

const data = await res.json();

setItems(data);

} catch (e) {

console.error("fetchItems error", e);

setItems([]); // show empty on error

}

};

useEffect(() => {

fetchItems(sourceFilter);

const id = setInterval(() => fetchItems(sourceFilter), 60000); // refresh every 60s

return () => clearInterval(id);

}, [sourceFilter]);

const handleClaim = (id) => {

setItems(prev => prev.filter(i => i.id !== id));

};

if (items === null) return <div>Loading available donations…</div>;

if (!items.length) return <div>No available donations right now.</div>;

return (

<div>

{items.map(i => <DonationCard key={i.id} donation={i} onClaimed={handleClaim} />)}

</div>

);

}

**Serializers.py/backend**

# users/serializers.py

from rest\_framework import serializers

from django.contrib.auth import get\_user\_model

from django.contrib.auth.password\_validation import validate\_password

User = get\_user\_model()

class RegisterSerializer(serializers.ModelSerializer):

password = serializers.CharField(write\_only=True, required=True)

password2 = serializers.CharField(write\_only=True, required=False)

class Meta:

model = User

fields = ["id", "username", "email", "password", "password2", "role", "avatar"]

extra\_kwargs = {

"email": {"required": True},

"username": {"required": True},

}

def validate\_email(self, value):

value = value.lower()

if User.objects.filter(email\_\_iexact=value).exists():

raise serializers.ValidationError("A user with that email already exists.")

return value

def validate(self, data):

# simple password validation; you can use more rules or require password2

password = data.get("password")

# optional confirm

password2 = data.get("password2")

if password2 is not None and password != password2:

raise serializers.ValidationError({"password2": "Passwords do not match."})

# run Django validators

try:

validate\_password(password)

except serializers.ValidationError as exc:

raise serializers.ValidationError({"password": list(exc.messages)})

return data

def create(self, validated\_data):

validated\_data.pop("password2", None)

password = validated\_data.pop("password")

user = User.objects.create(

username=validated\_data["username"],

email=validated\_data.get("email"),

role=validated\_data.get("role", "other"),

avatar=validated\_data.get("avatar", "avatar1.png"),

)

user.set\_password(password)

user.save()

return user

class UserSerializer(serializers.ModelSerializer):

class Meta:

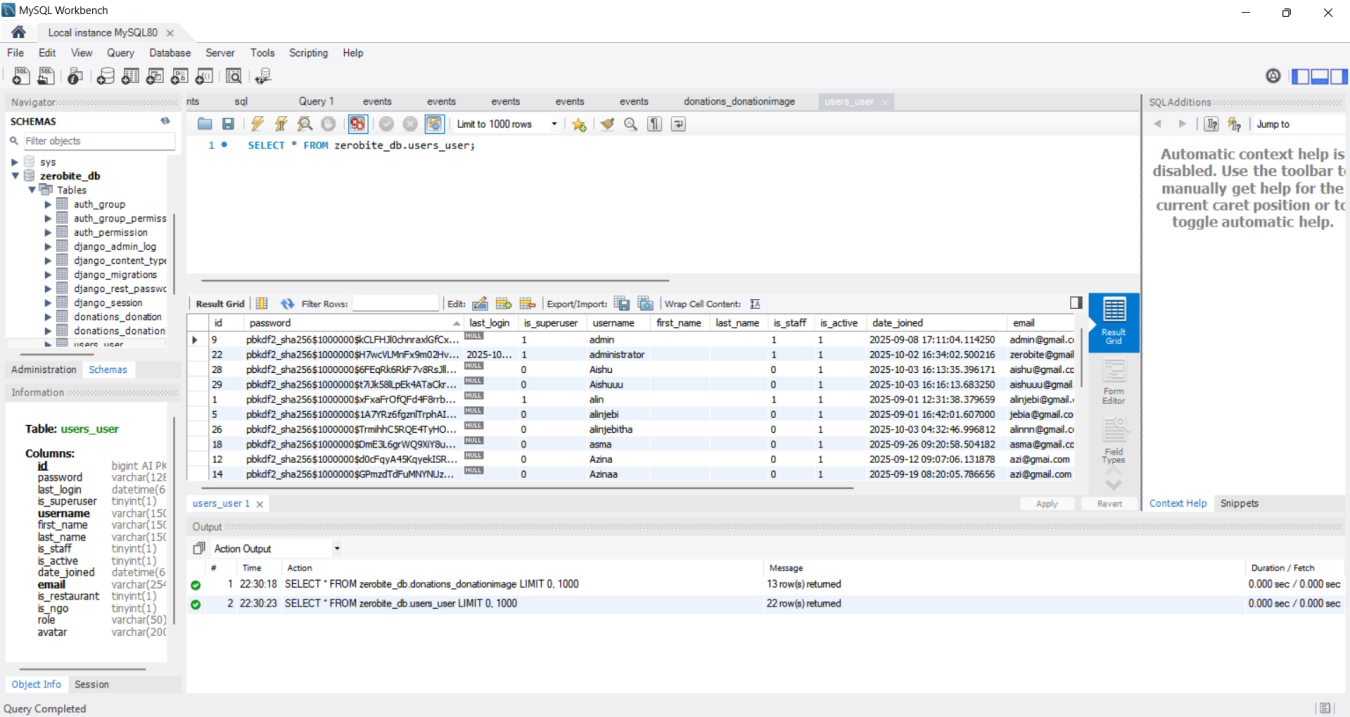
model = User

fields = ["id", "username", "email", "role", "avatar", "is\_staff", "is\_superuser"]

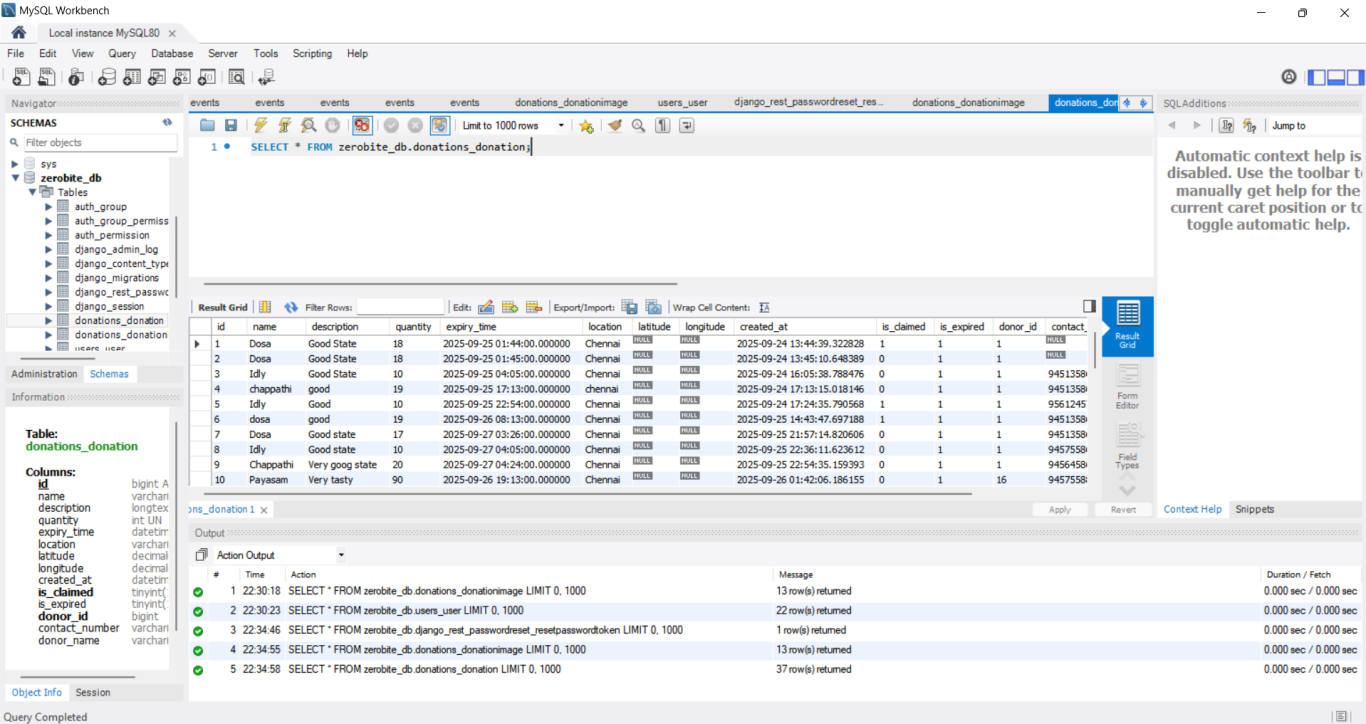
read\_only\_fields = ["is\_staff", "is\_superuser"]

**A 3. SAMPLE SCREENSHOTS**

***MySql Data Storage***

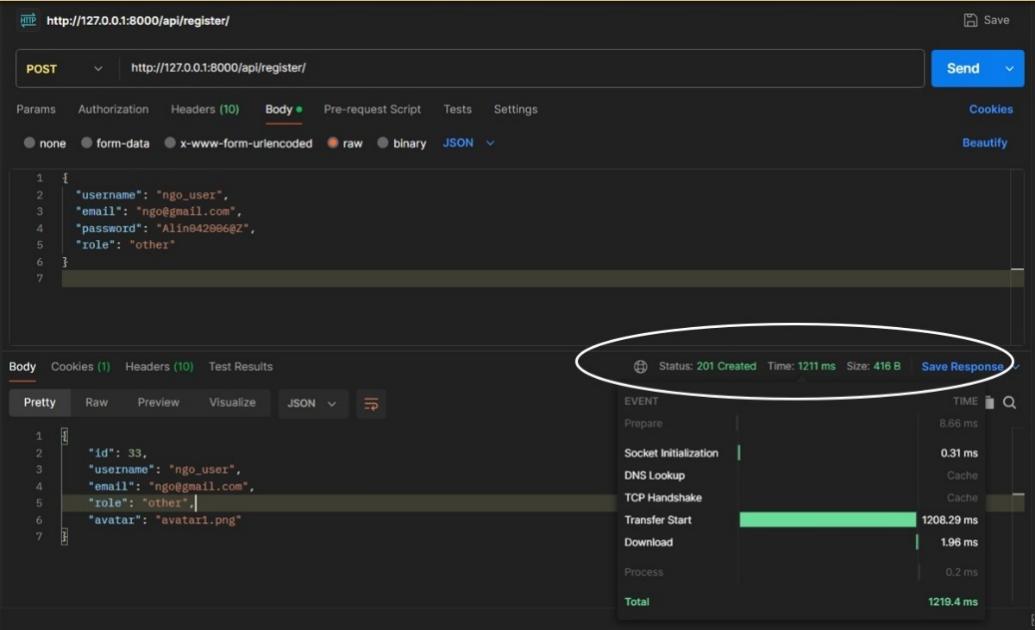


***Fig 4.1.1 MySql Workbench saving the data of the users***

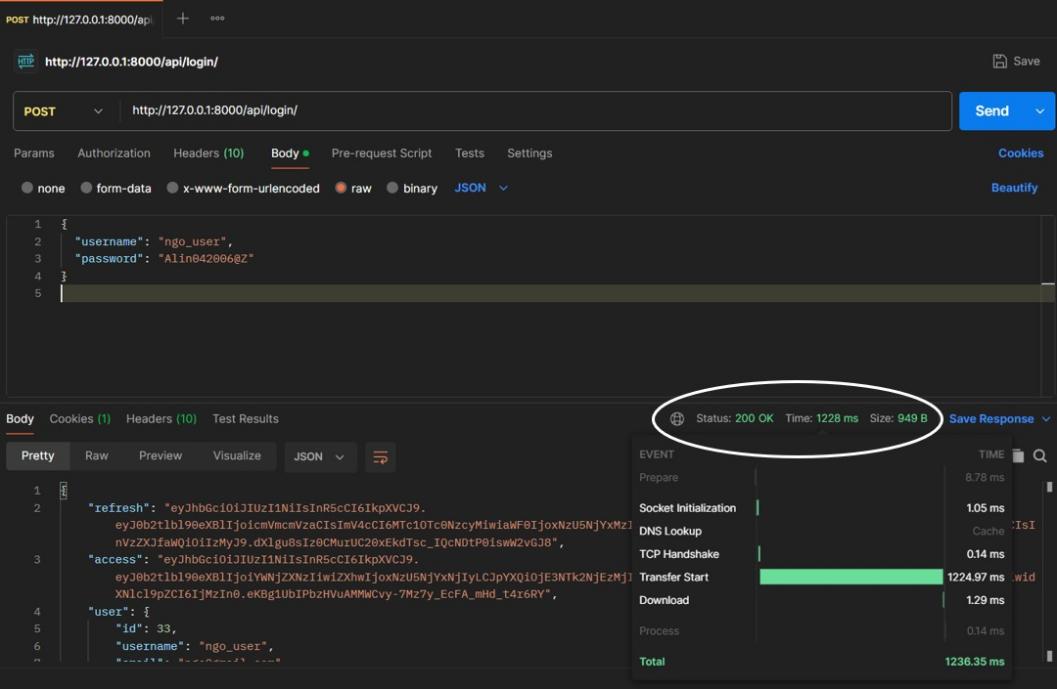
******

***Fig 4.1.2 MySql Workbench saving the data of the donations***

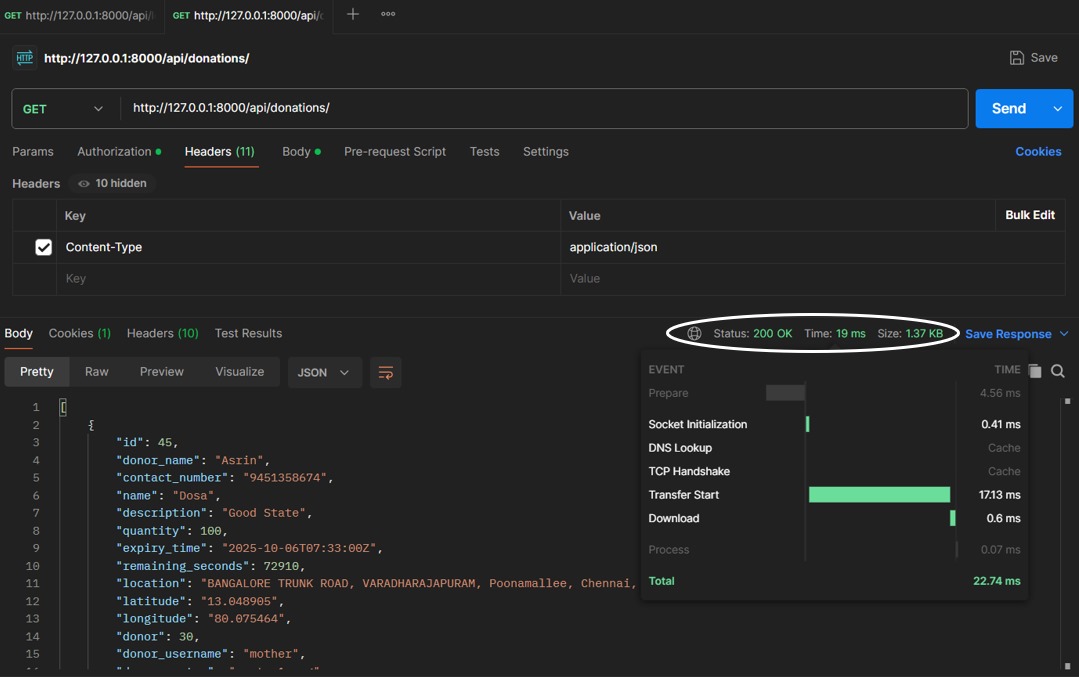
***Screenshot of System testing***



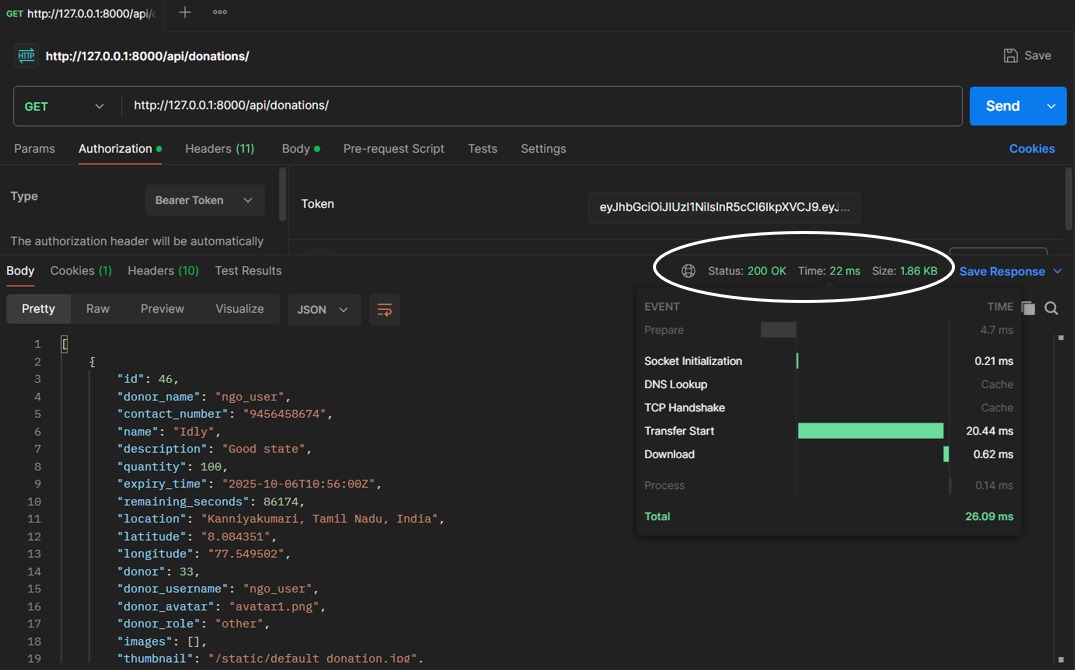
***Fig 6.1.1 System Response Time of Register (Postman)***



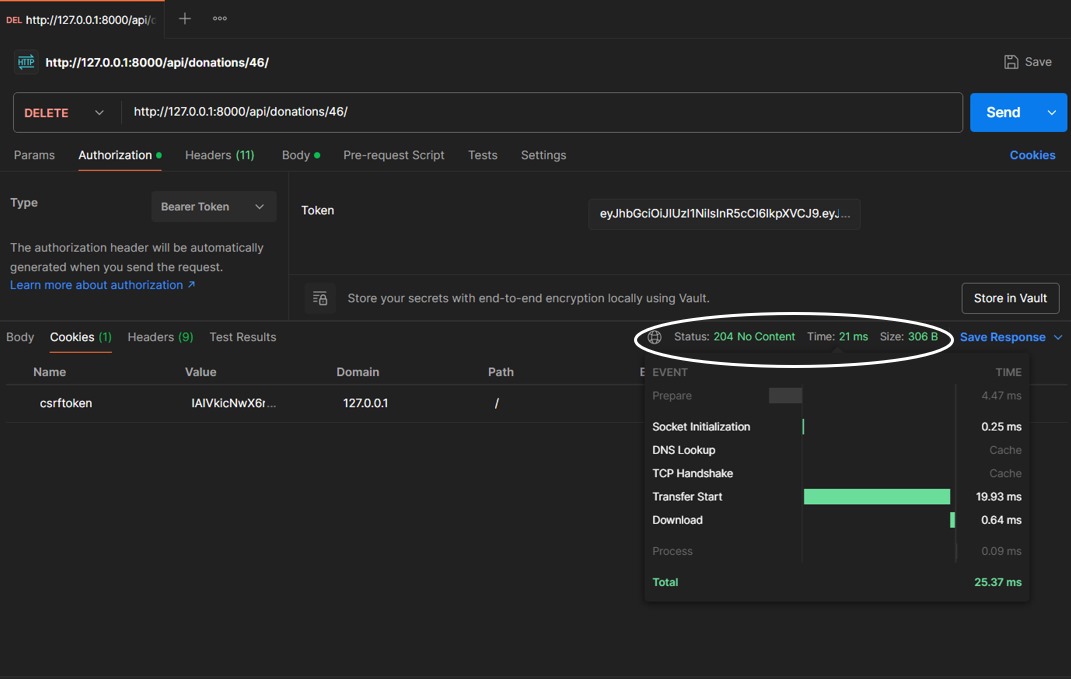
***Fig 6.1.2 System Response Time of Login (Postman)***



***Fig 6.1.3 System Response Time of Viewing all the donations (Postman)***

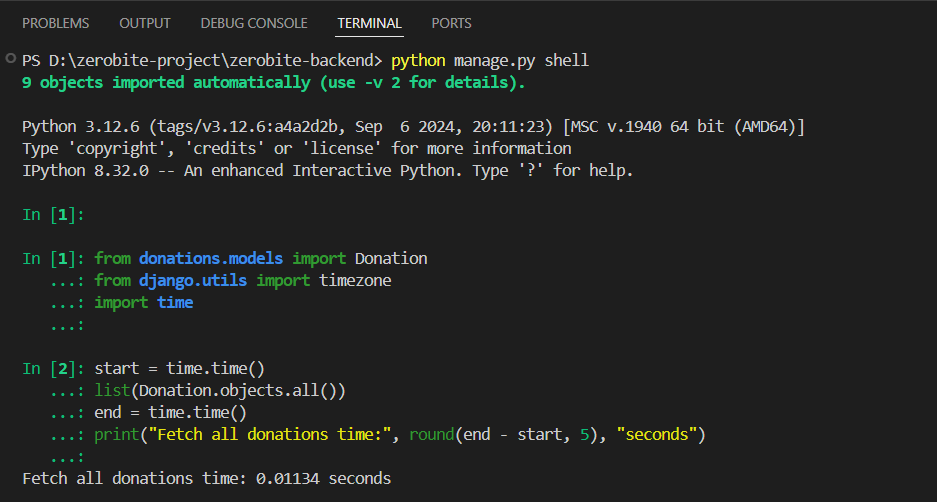


***Fig 6.1.4 System Response Time of Viewing a separate donation (Postman)***



***Fig 6.1.5 System Response Time of Deleting a separate donation (Postman)***

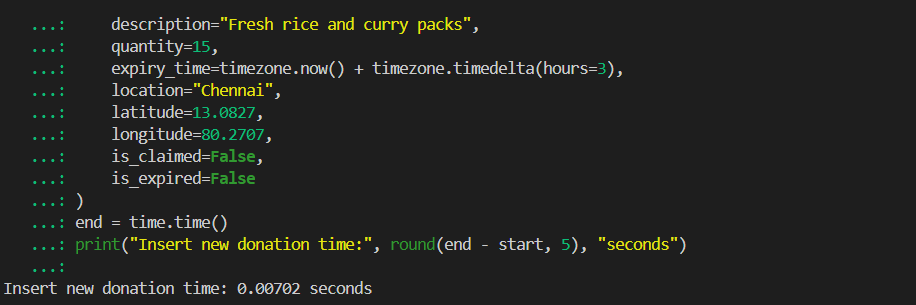
***Database Performance***

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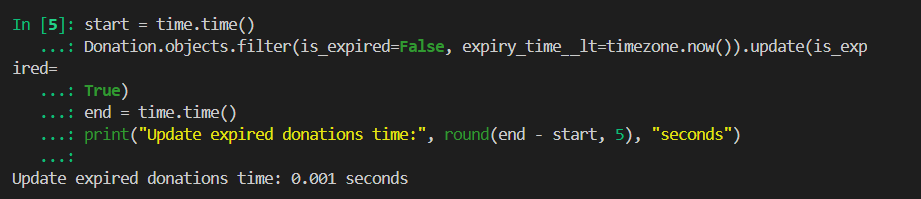
***Fig 6.2.1 Fetch all donation (Python shell)***

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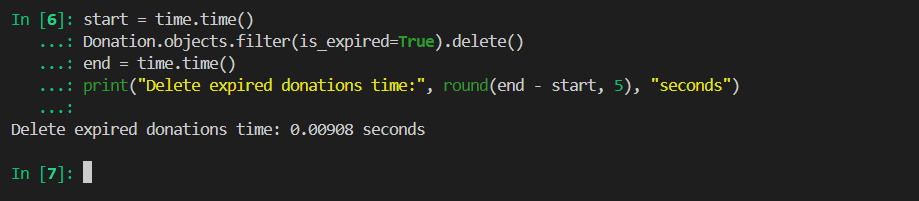
***Fig 6.2.2 Filter available donation (Python shell)***

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***Fig 6.2.3 Insert new donation (Python shell)***

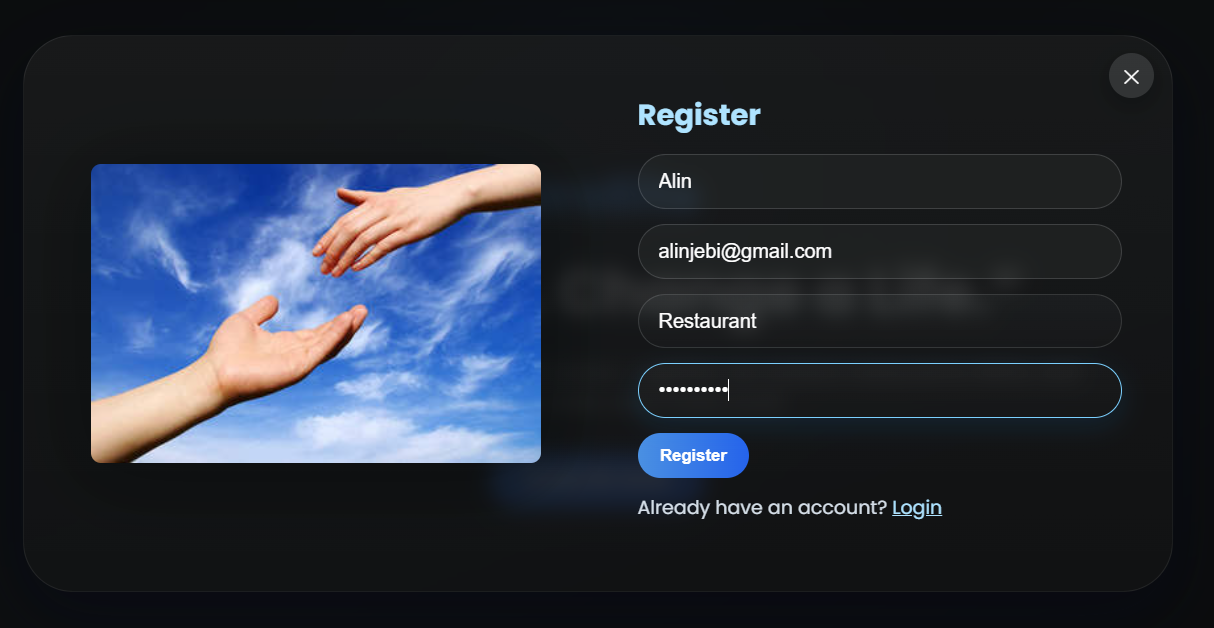
******

***Fig 6.2.4 Update expired donations (Python shell)***

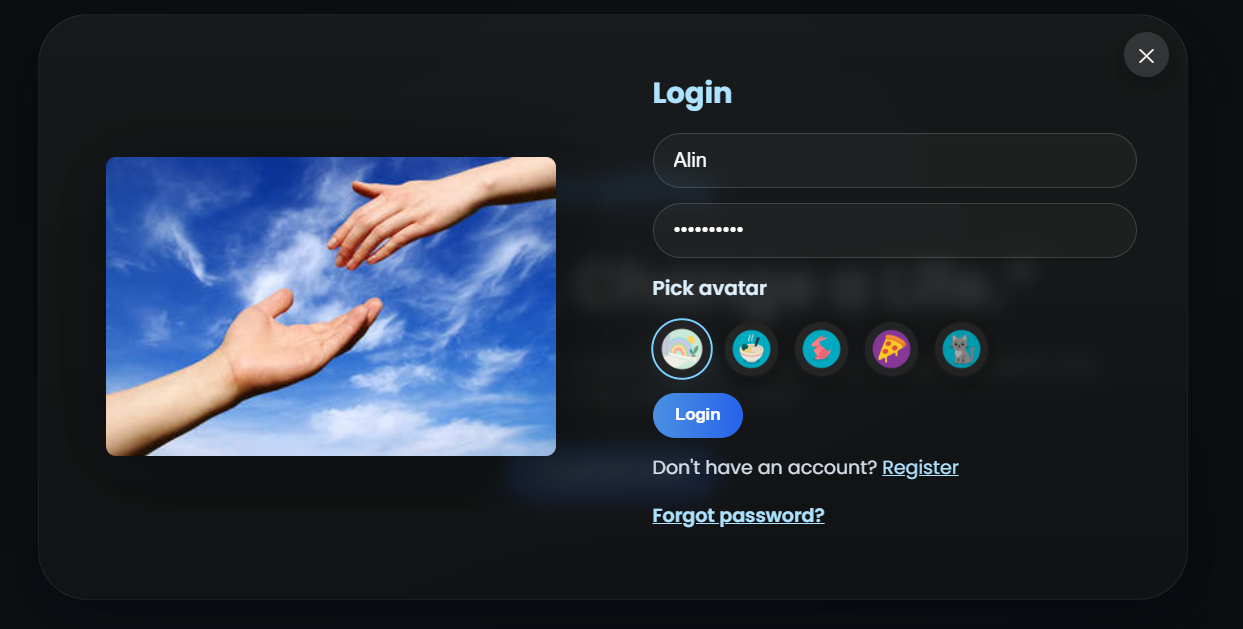
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***Fig 6.2.5 Delete expired donations (Python shell)***

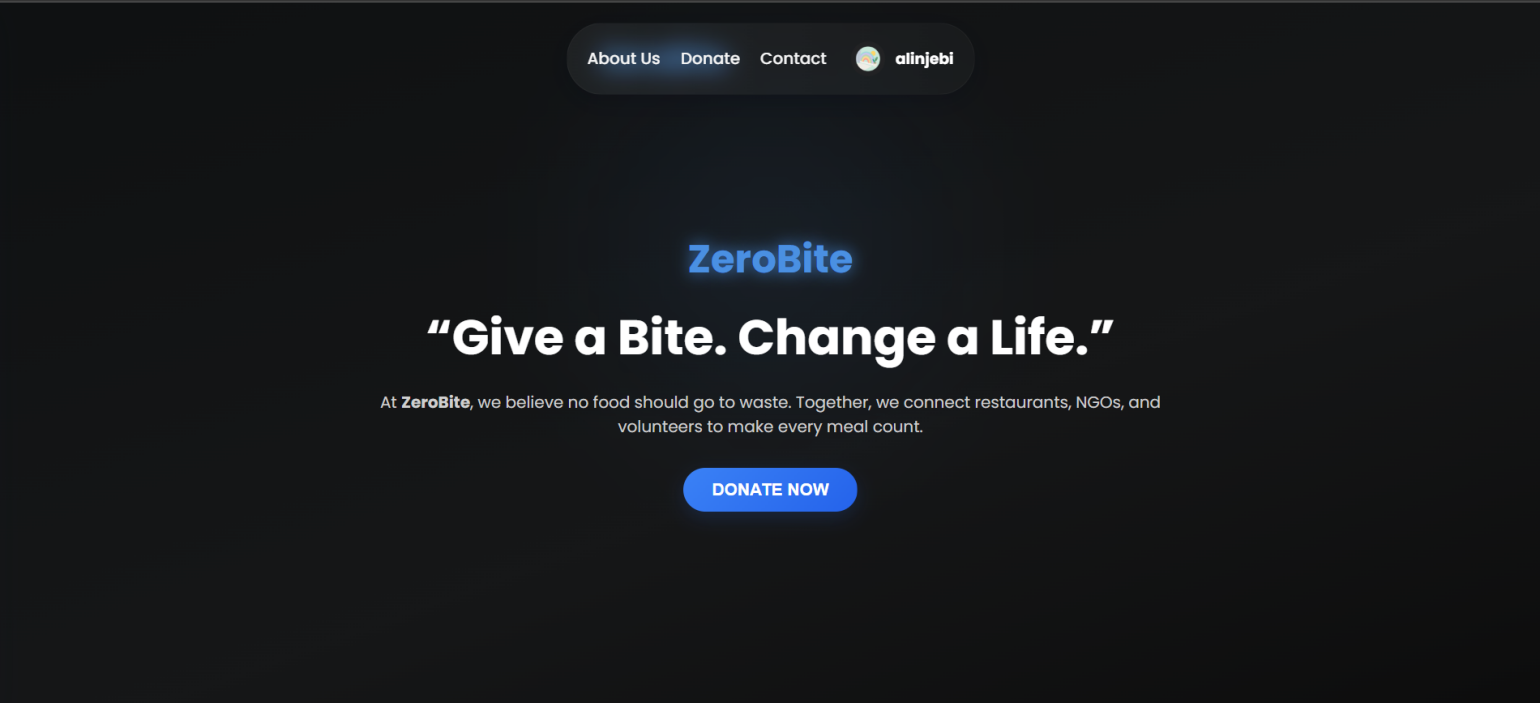
***Results***

****

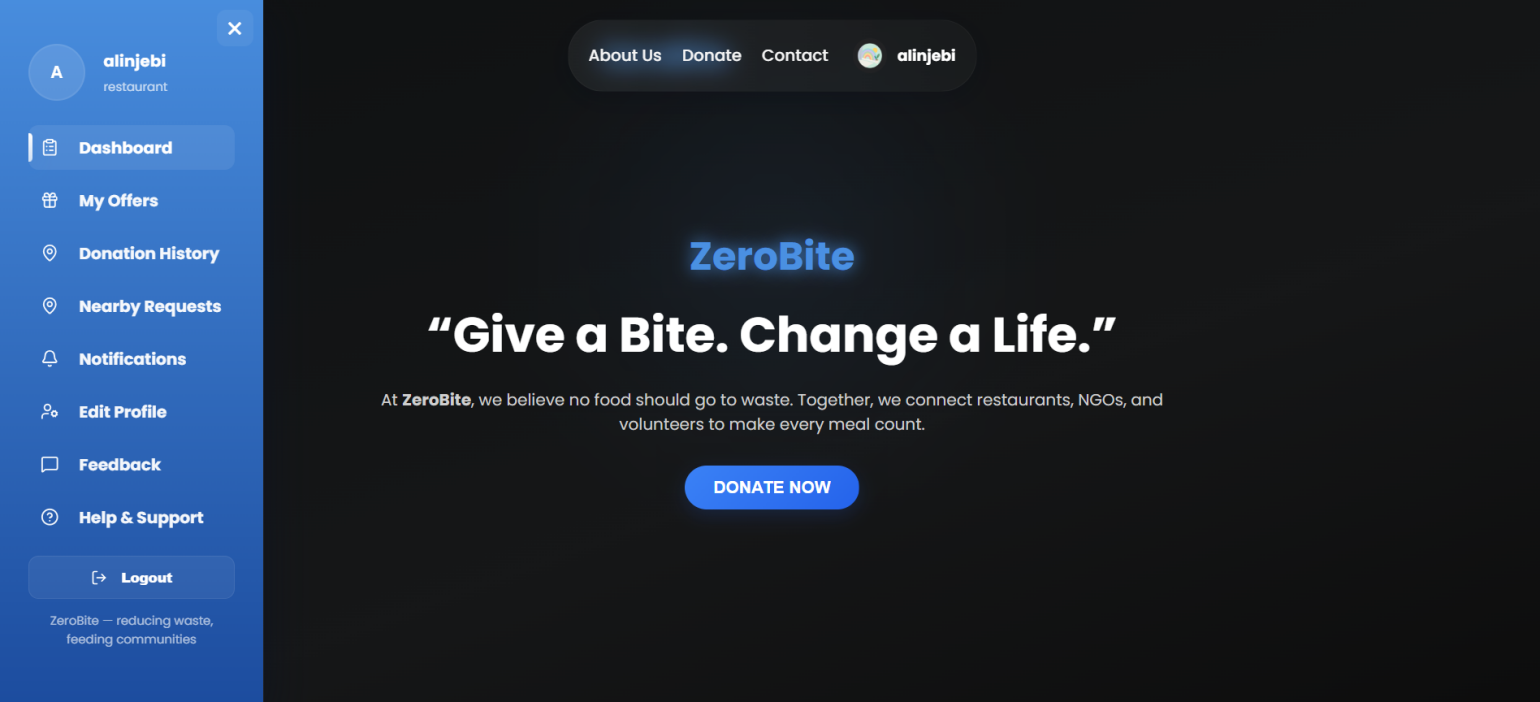
***Fig A3.1 ZeroBite Register Page***

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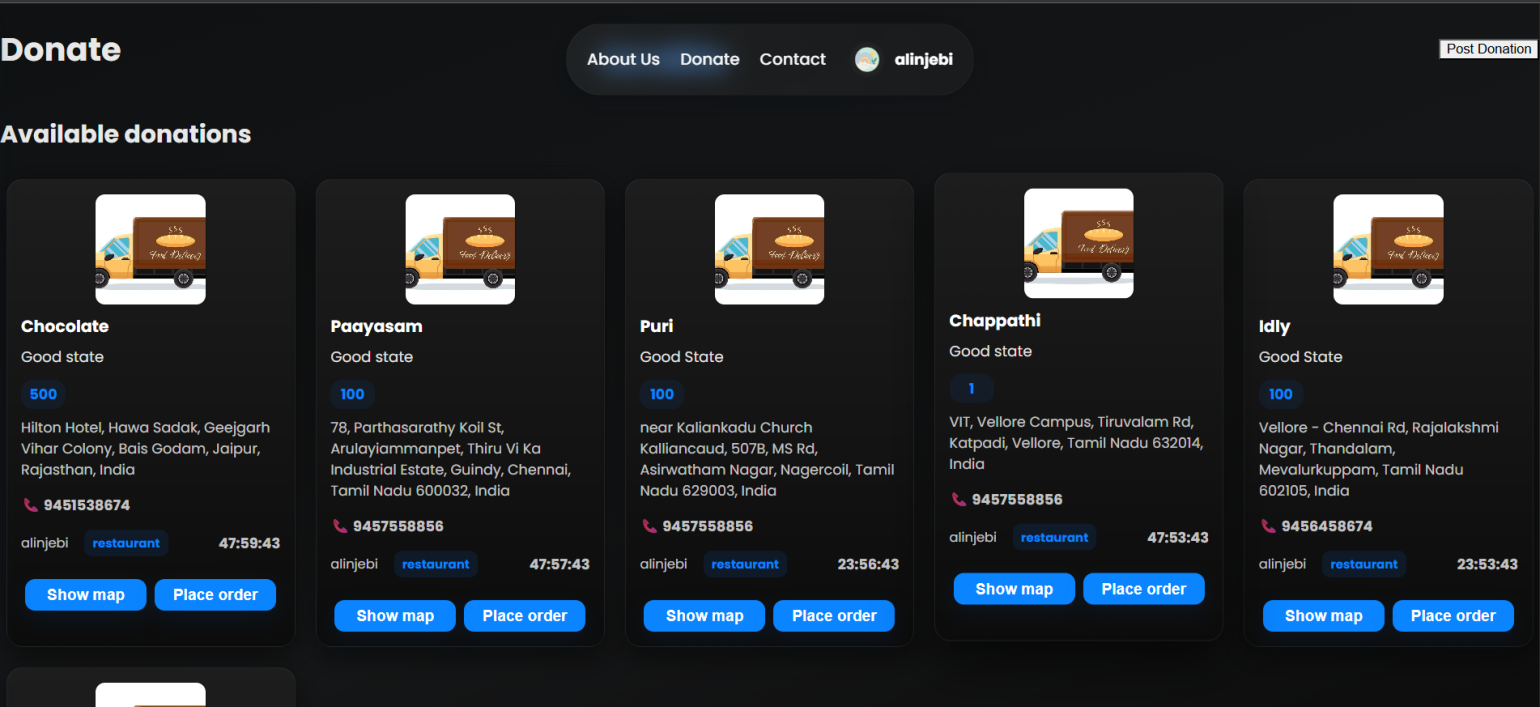
***Fig A3.2 ZeroBite Login Page***



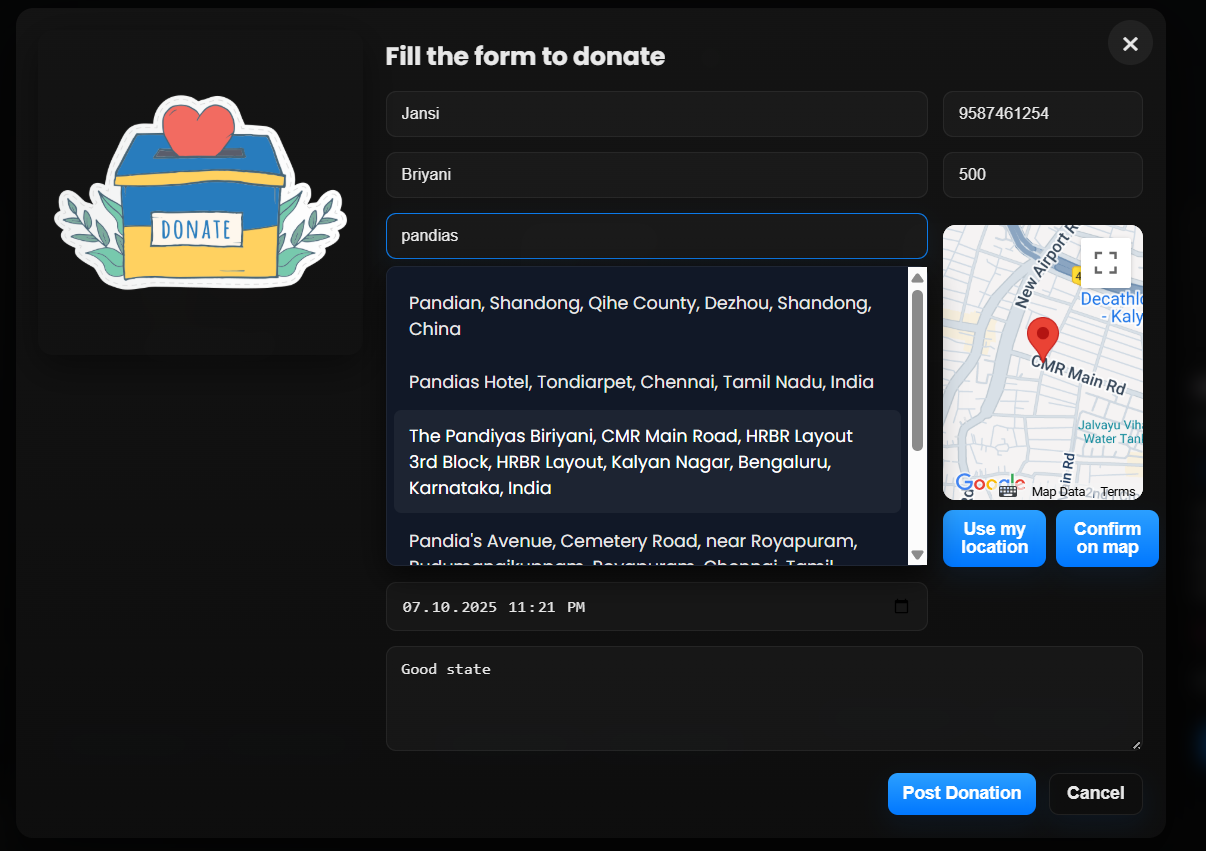
***Fig A3.3 ZeroBite Dashboard Page***



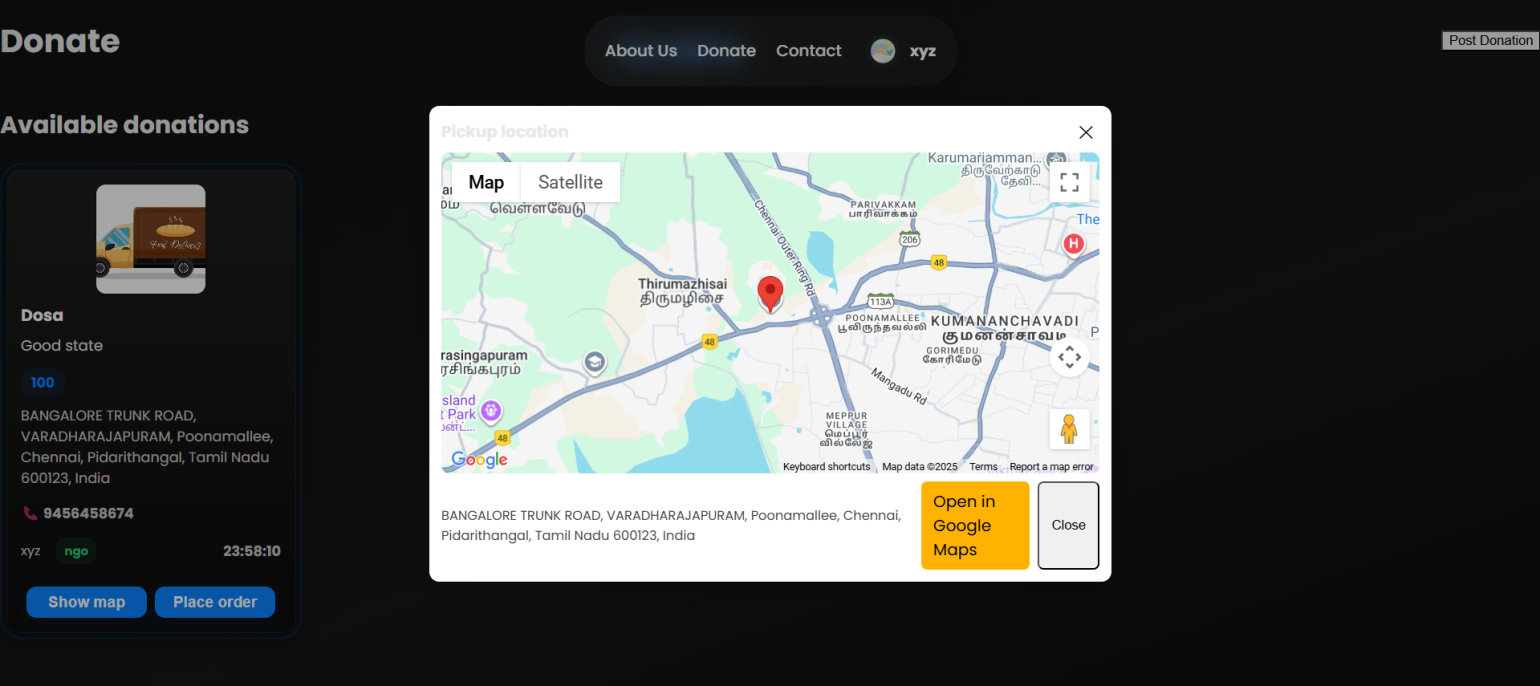
***Fig A3.4 ZeroBite Sidebar Page***



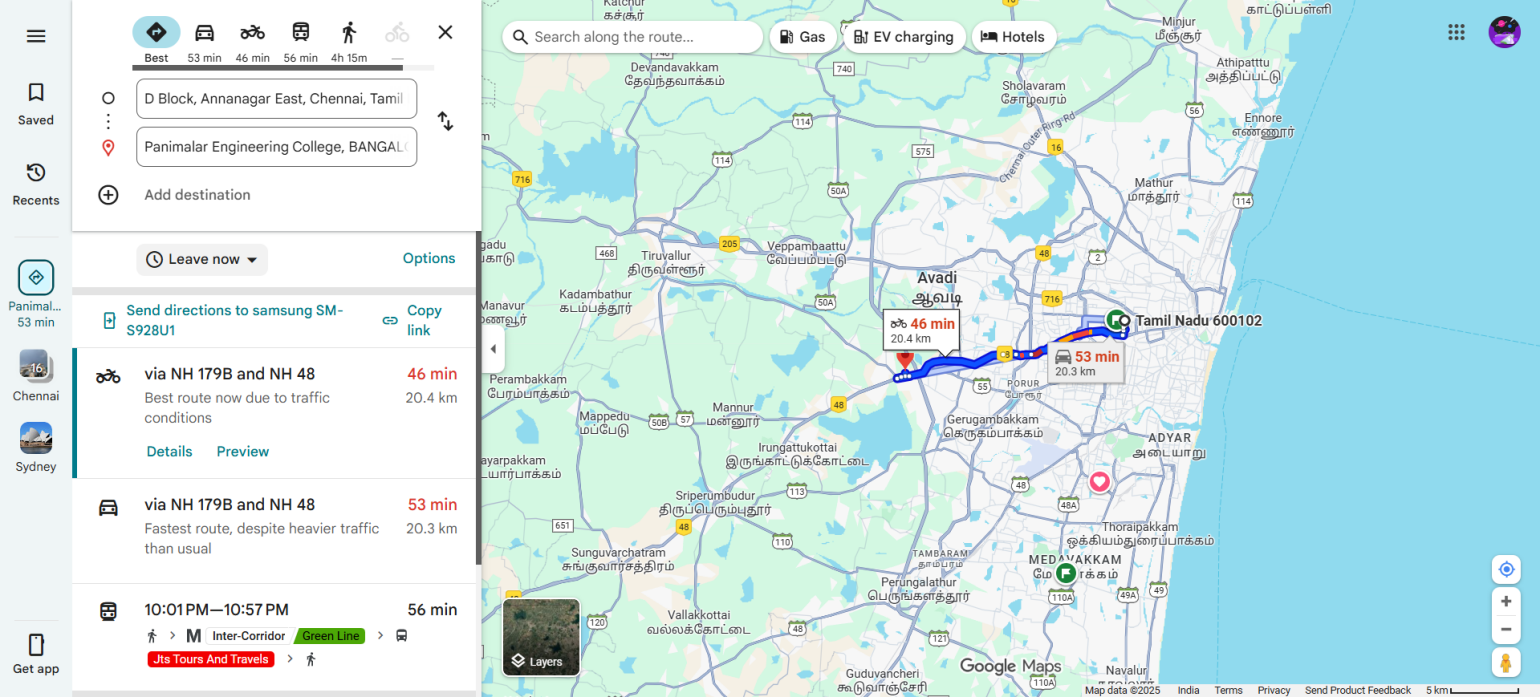
***Fig A3.5 ZeroBite Donation Page with Donation Expiry time***



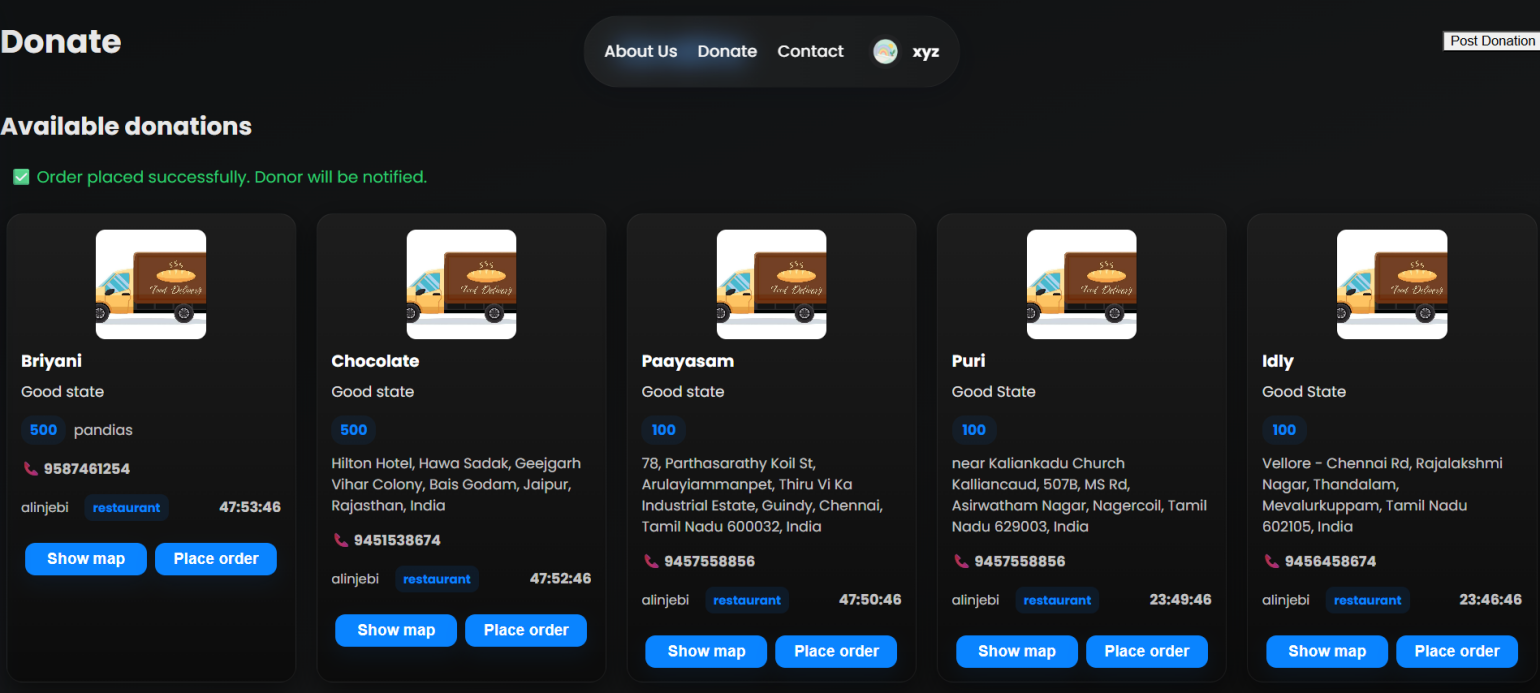
***Fig A3.6 ZeroBite Donation Form Page***

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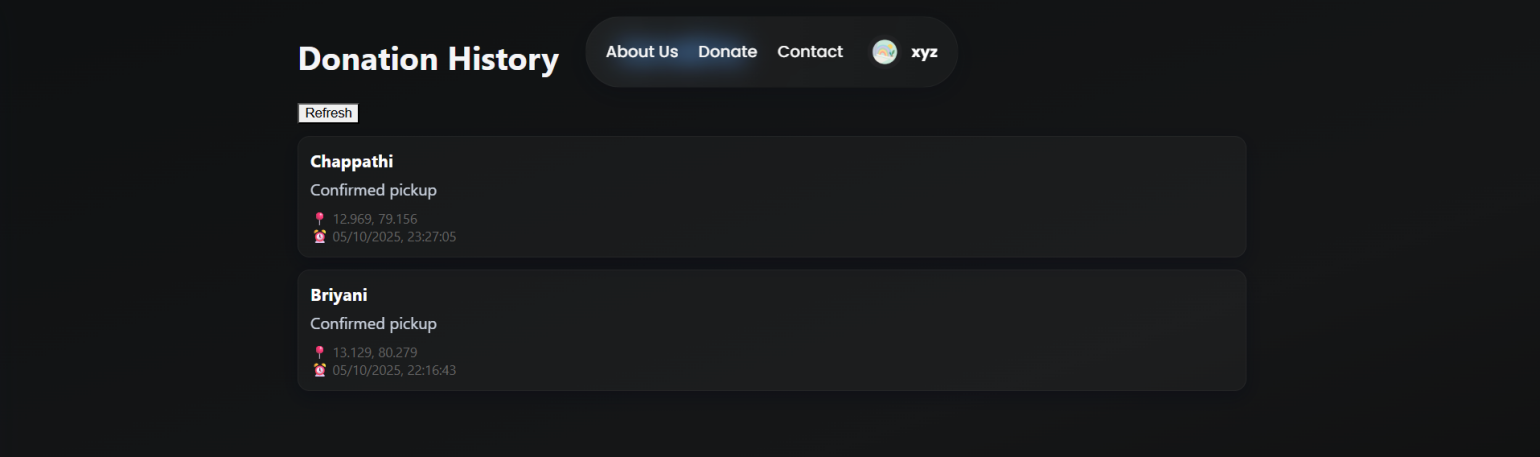
***Fig A3.7 Location is visible using show map***

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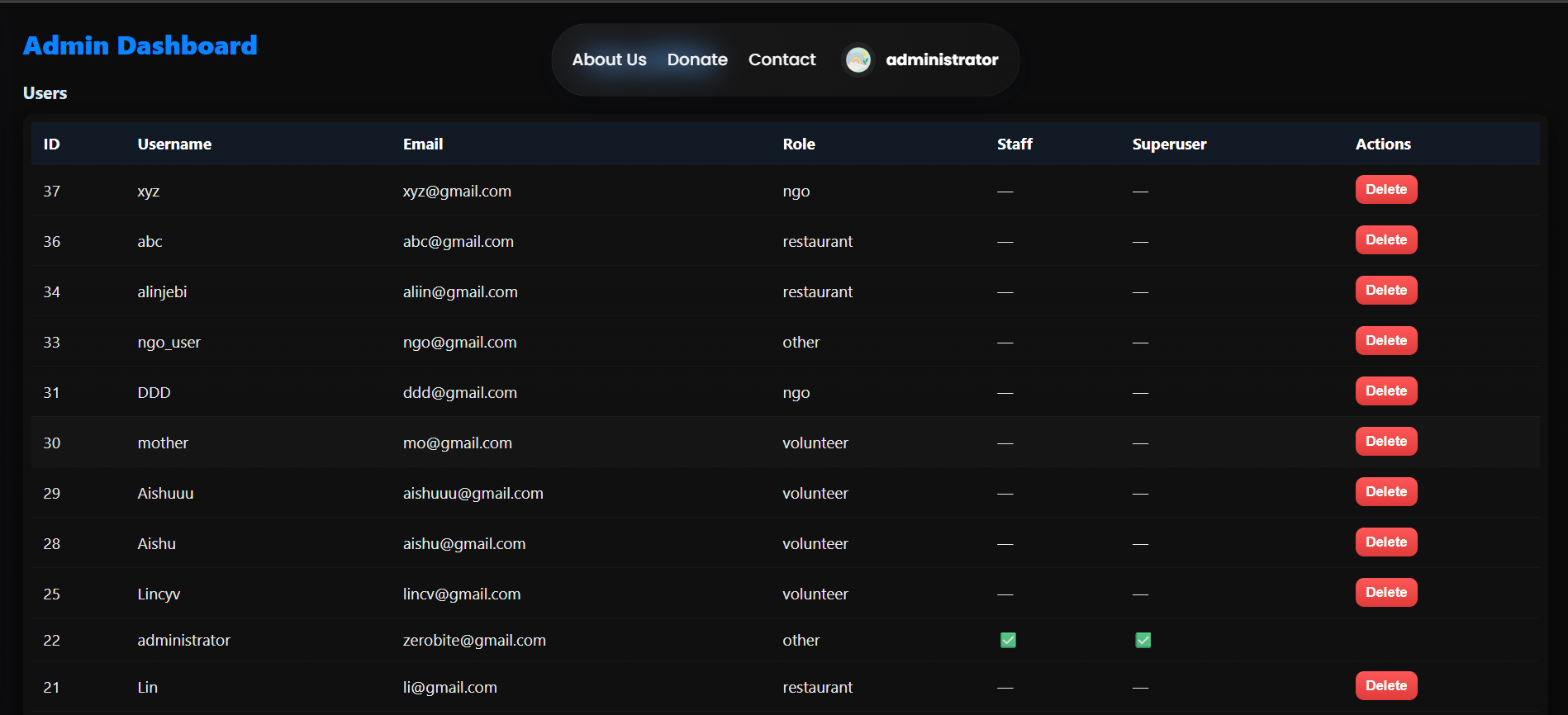
***Fig A3.8 Location is visible and has open in Google map to collect the order***



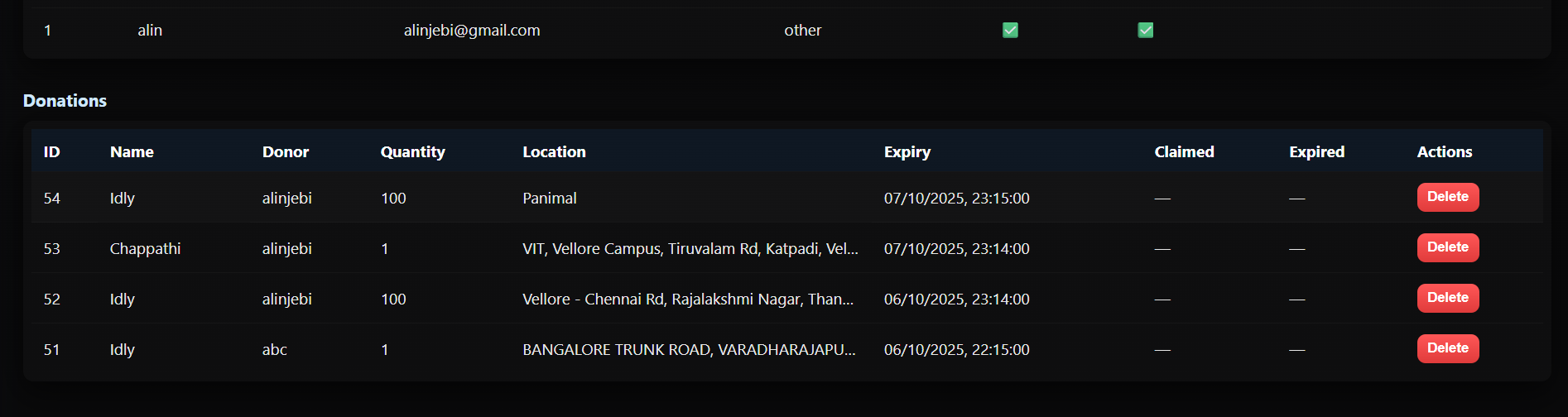
***Fig A3.9 After user successfully Placed the order***

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***Fig A3.10 User can view the placed order***

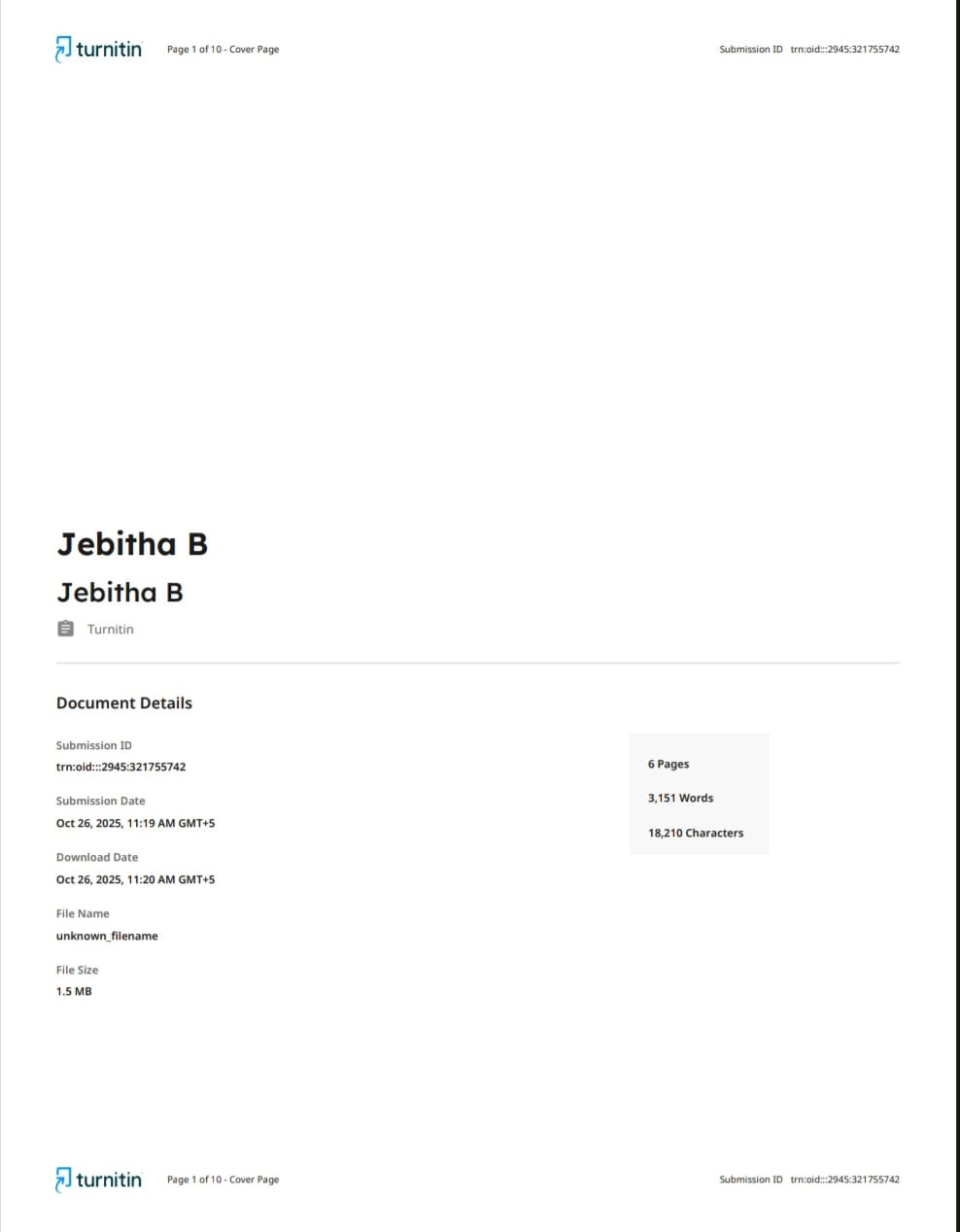


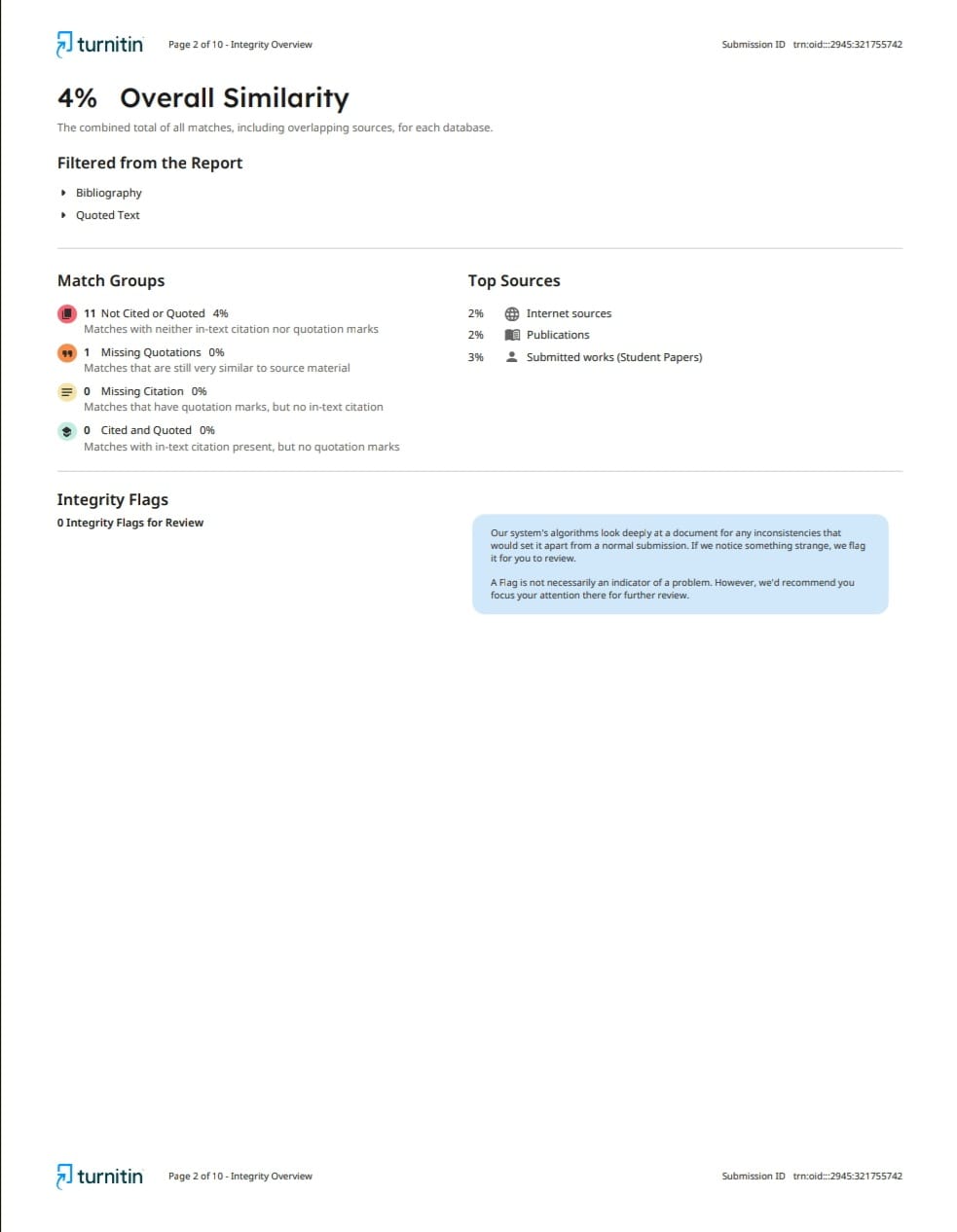
***Fig A3.11 Administrator Page for users***

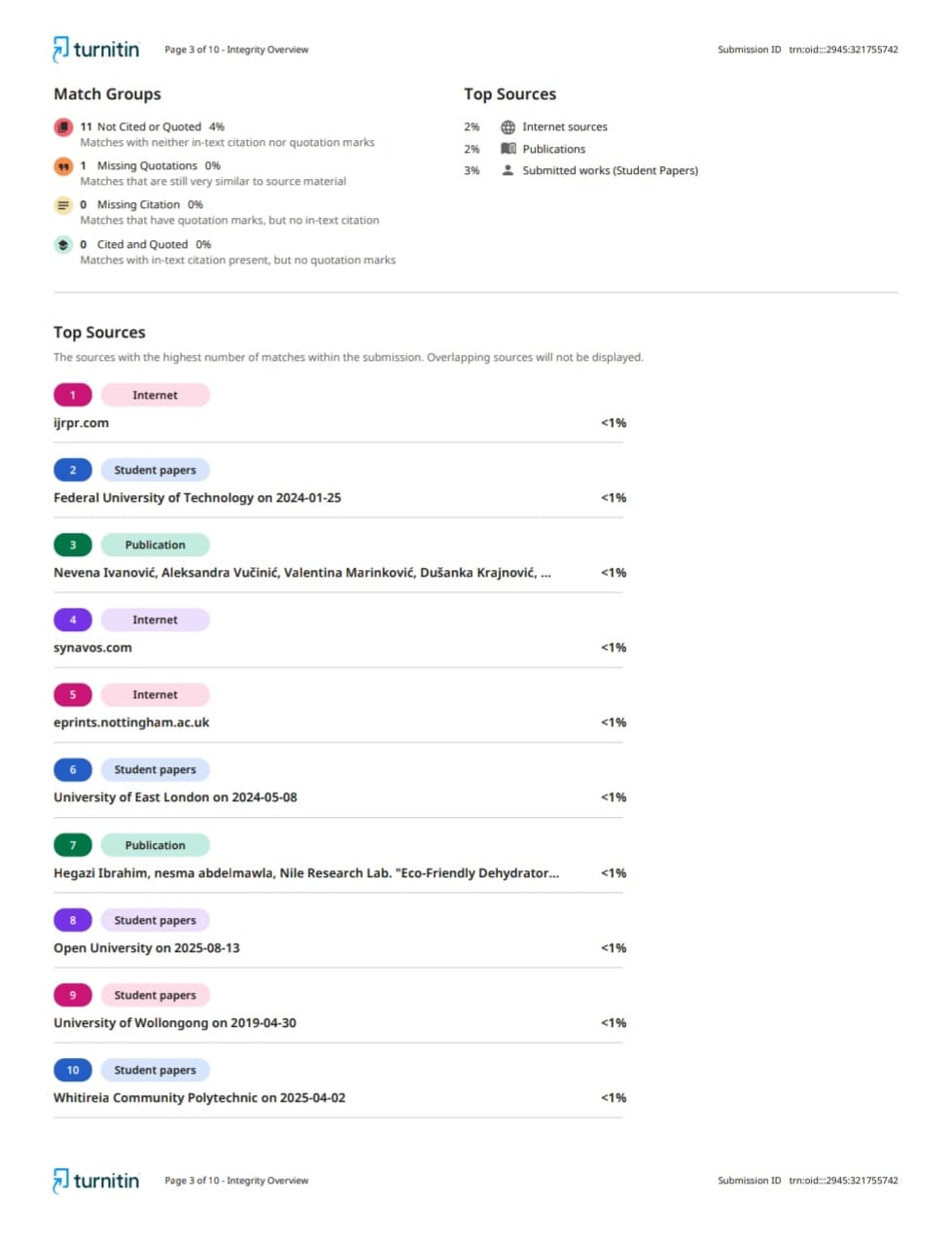


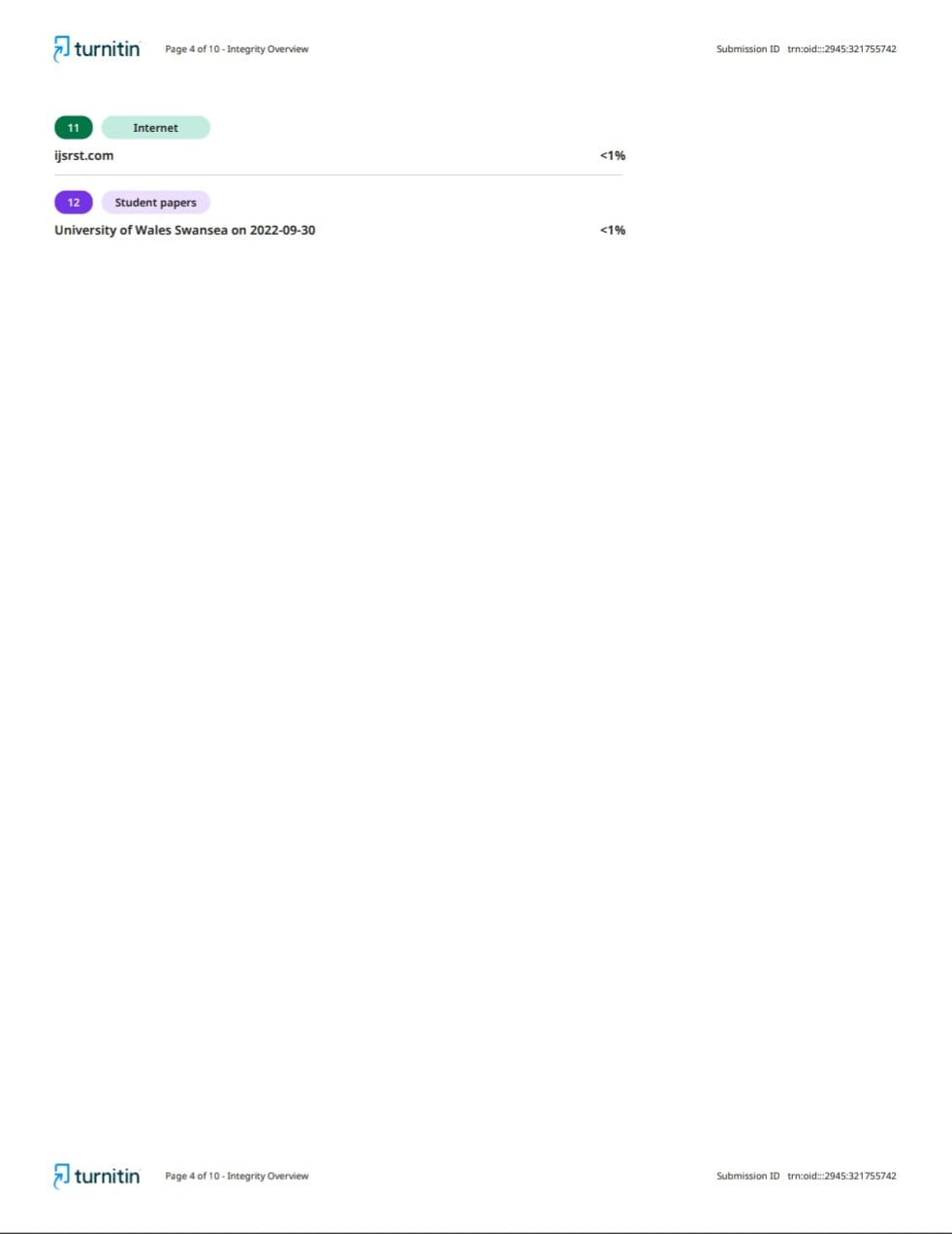
***Fig A3.12 Administrator Page for Donations***

**APPENDIX D:** **PLAGARISM REPORT**

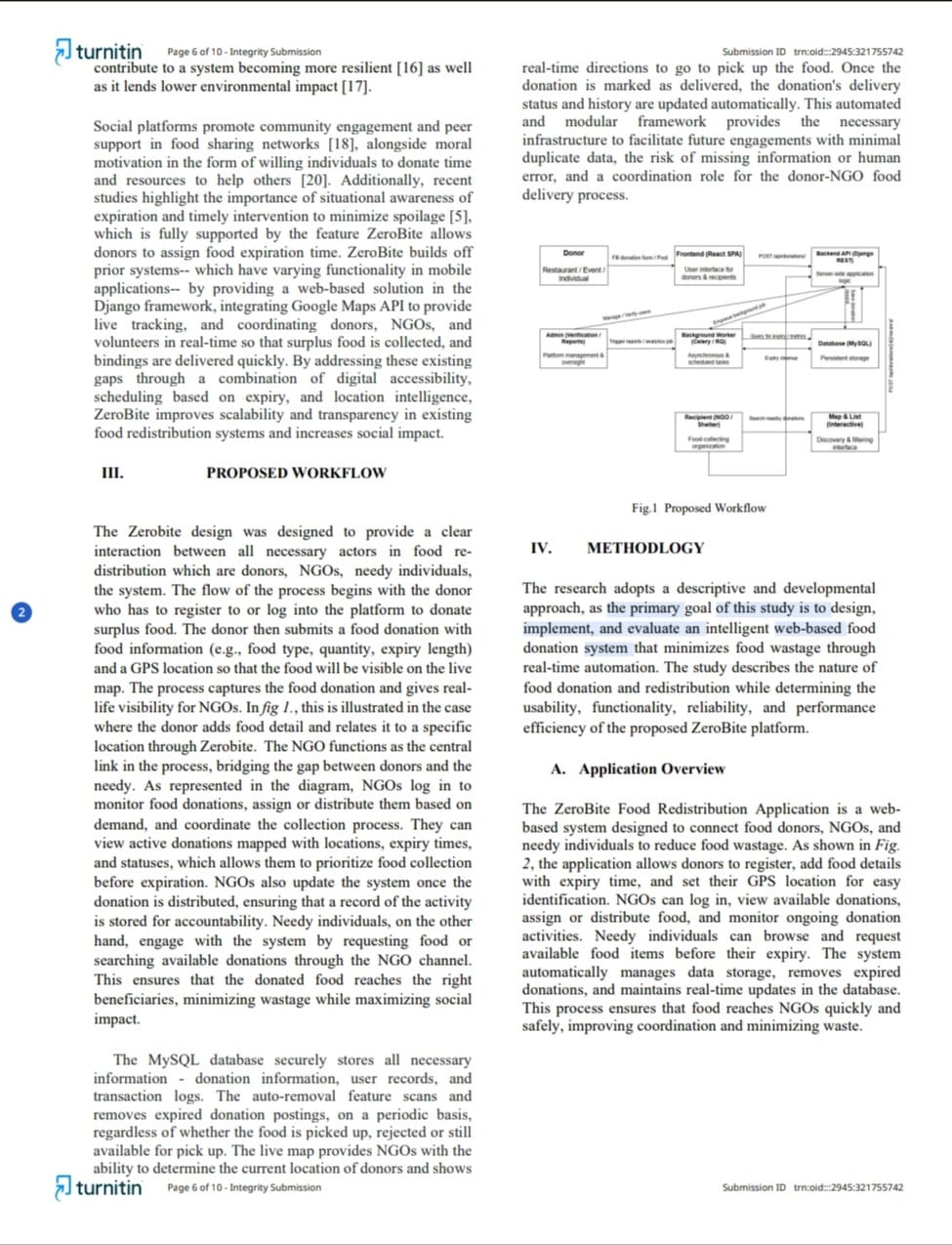


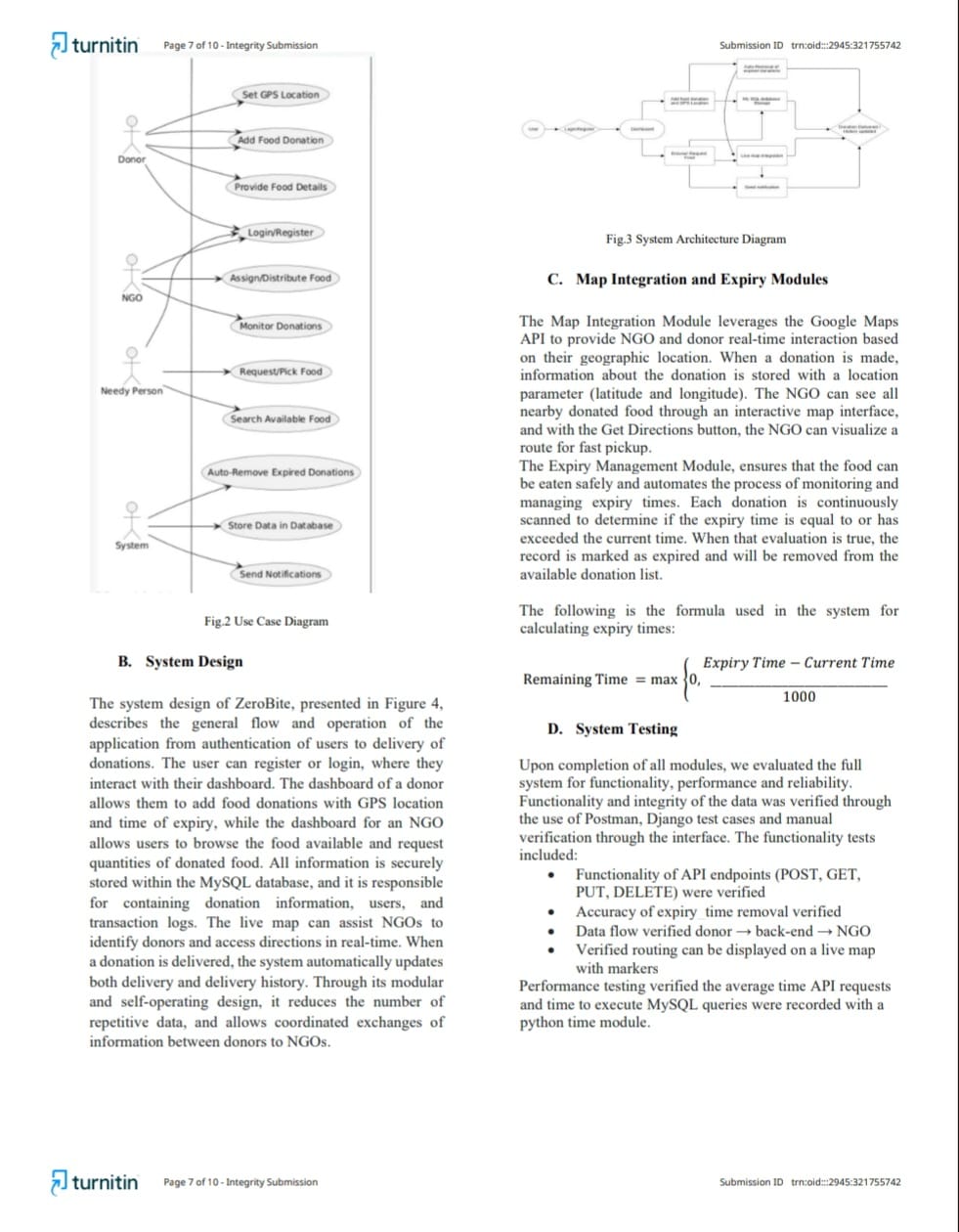


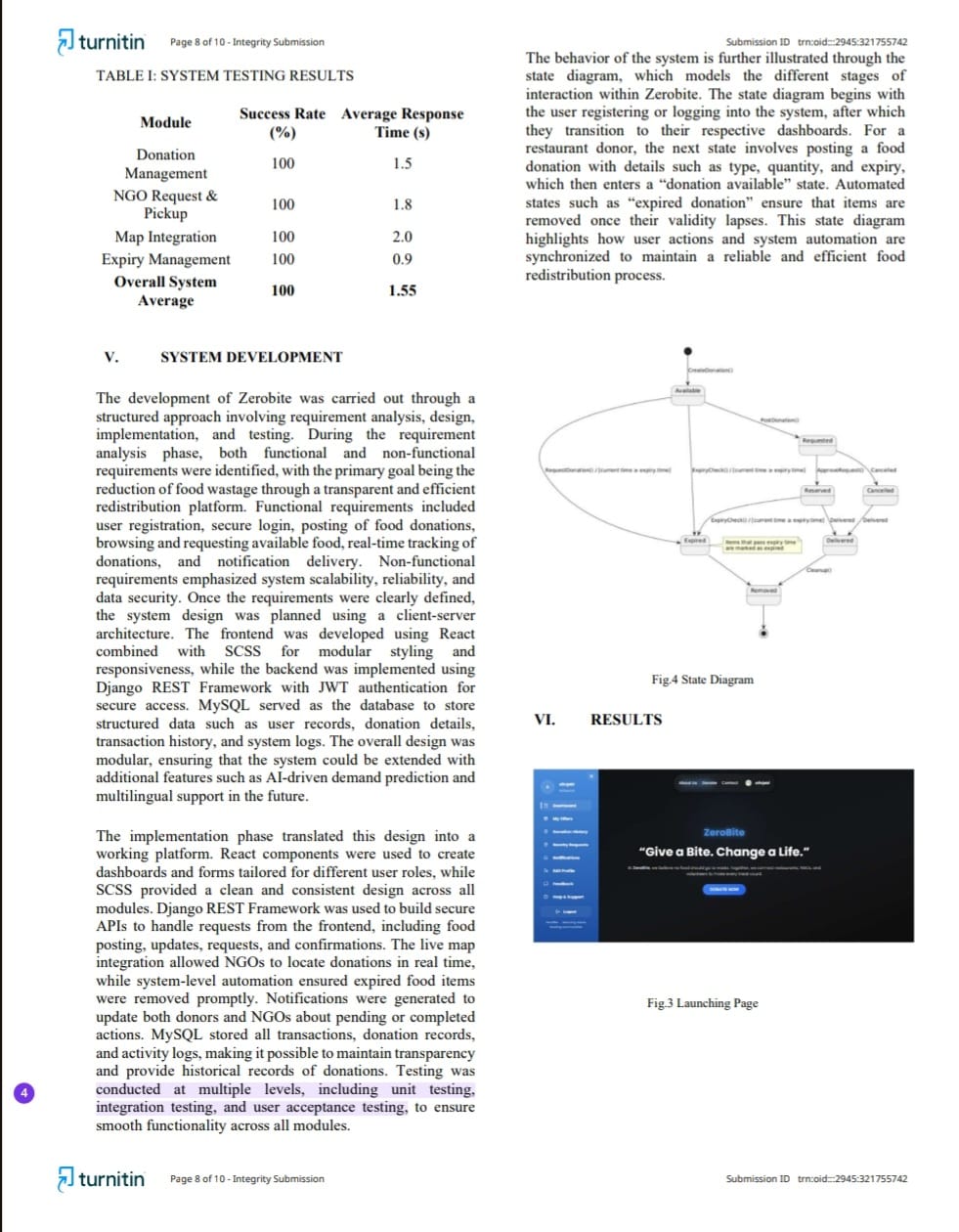


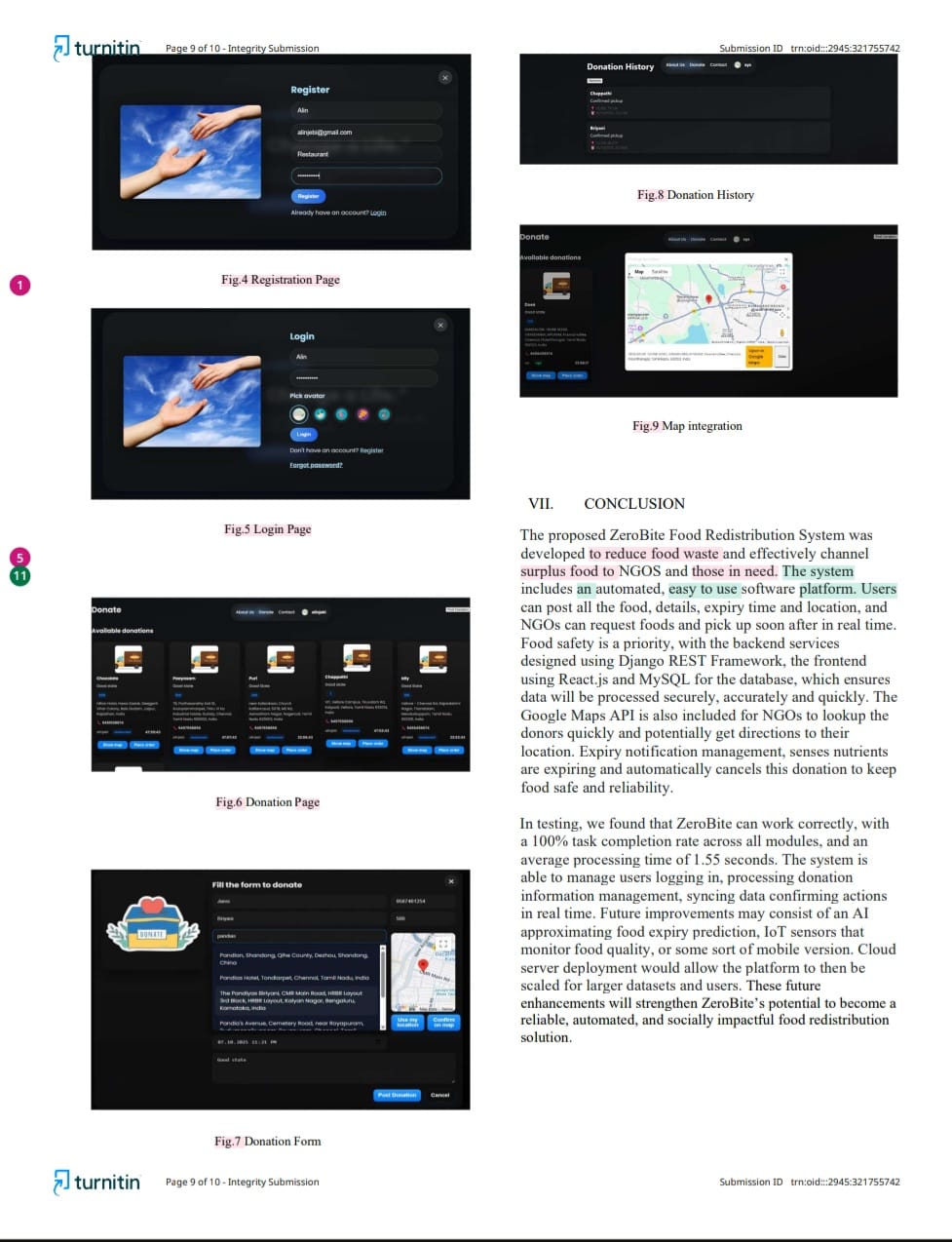


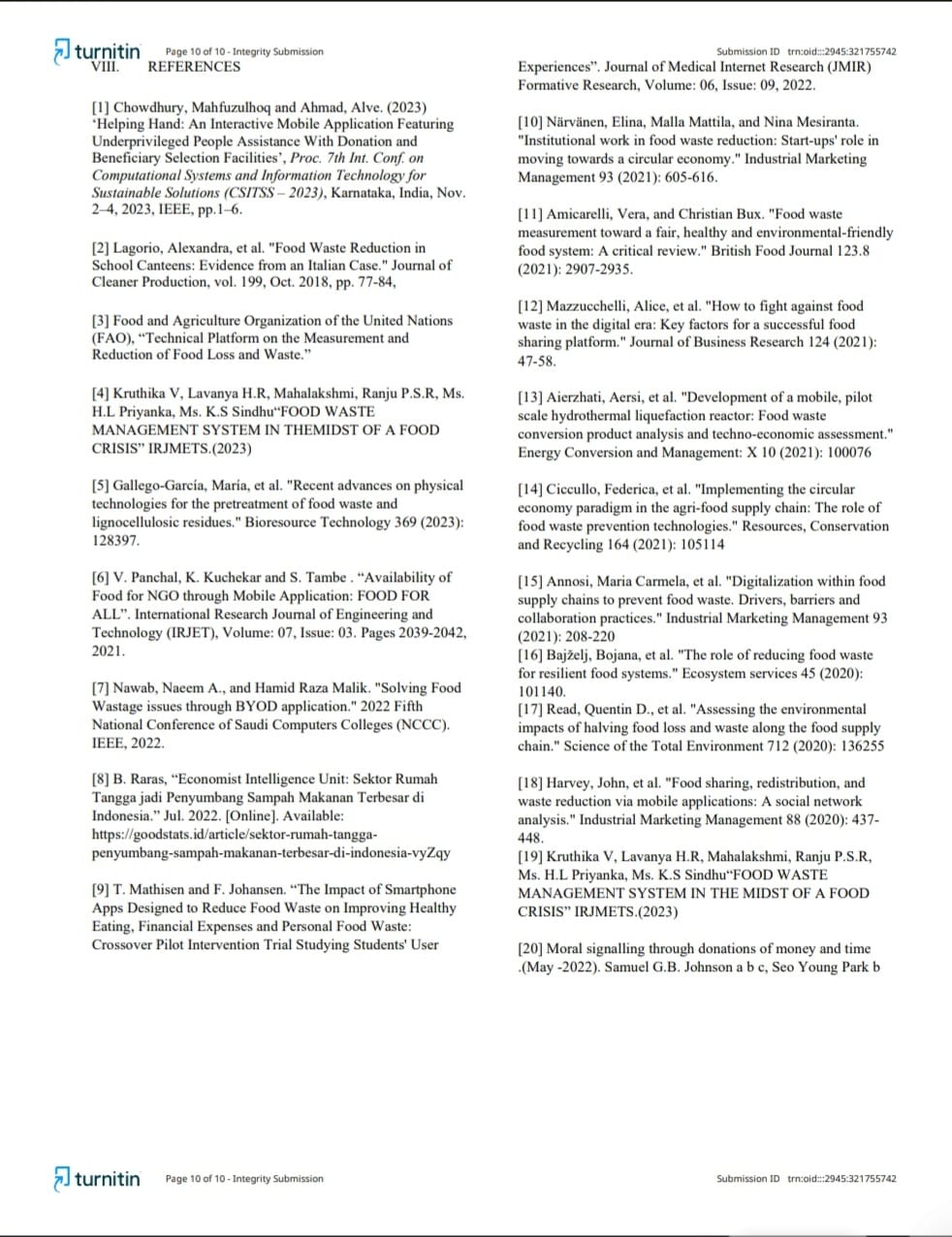












**REFERENCES**

**REFERENCES**

1. Chowdhury, Mahfuzulhoq and Ahmad, Alve. (2023) ‘Helping Hand: An Interactive Mobile Application Featuring Underprivileged People Assistance With Donation and Beneficiary Selection Facilities’, *Proc. 7th Int. Conf. on Computational Systems and Information Technology for Sustainable Solutions (CSITSS – 2023)*, Karnataka, India, Nov. 2–4, 2023, IEEE, pp.1–6.

1. Lagorio, Alexandra, et al. "Food Waste Reduction in School Canteens: Evidence from an Italian Case." Journal of Cleaner Production, vol. 199, Oct. 2018, pp. 77-84,
2. Food and Agriculture Organization of the United Nations (FAO), “Technical Platform on the Measurement and Reduction of Food Loss and Waste.”
3. Kruthika V, Lavanya H.R, Mahalakshmi, Ranju P.S.R, Ms. H.L Priyanka, Ms. K.S Sindhu“FOOD WASTE MANAGEMENT SYSTEM IN THEMIDST OF A FOOD CRISIS” IRJMETS.(2023)
4. Gallego-García, María, et al. "Recent advances on physical technologies for the pretreatment of food waste and lignocellulosic residues." Bioresource Technology 369 (2023): 128397.
5. V. Panchal, K. Kuchekar and S. Tambe . “Availability of Food for NGO through Mobile Application: FOOD FOR ALL”. International Research Journal of Engineering and Technology (IRJET), Volume:07, Issue: 03. Pages 2039-2042, 2021.
6. Nawab, N.A. and Malik, H.R. (2022) ‘Solving Food Wastage Issues Through BYOD Application’, Proc. Fifth National Conference of Saudi Computers Colleges (NCCC), IEEE, pp.1–6.
7. B. Raras, “Economist Intelligence Unit: Sektor Rumah Tangga jadi Penyumbang Sampah Makanan Terbesar di Indonesia.” Jul. 2022. [Online]. Available: <https://goodstats.id/article/sektor-rumah-tangga-penyumbang-sampah-makanan-terbesar-di-indonesia-vyZqy>
8. T. Mathisen and F. Johansen. “The Impact of Smartphone Apps Designed to Reduce Food Waste on Improving Healthy Eating, Financial Expenses and Personal Food Waste: Crossover Pilot Intervention Trial Studying Students' User Experiences”. Journal of Medical Internet Research (JMIR) Formative Research, Volume: 06, Issue: 09, 2022.
9. Närvänen, E., Mattila, M. and Mesiranta, N. (2021) ‘Institutional Work in Food Waste Reduction: Start-ups’ Role in Moving Towards a Circular Economy’, Industrial Marketing Management, Vol.93, pp.605–616.
10. Amicarelli, V. and Bux, C. (2021) ‘Food Waste Measurement Toward a Fair, Healthy and Environmentally Friendly Food System: A Critical Review’, British Food Journal, Vol.123, No.8, pp.2907–2935.
11. Mazzucchelli, A., et al. (2021) ‘How to Fight Against Food Waste in the Digital Era: Key Factors for a Successful Food Sharing Platform’, Journal of Business Research, Vol.124, pp.47–58.
12. Aierzhati, A., et al. (2021) ‘Development of a Mobile, Pilot Scale Hydrothermal Liquefaction Reactor: Food Waste Conversion Product Analysis and Techno-Economic Assessment’, Energy Conversion and Management: X, Vol.10, pp.100076.
13. Ciccullo, F., Pero, M., Caridi, M. and Gosling, J. (2021) ‘Implementing the Circular Economy Paradigm in the Agri-Food Supply Chain: The Role of Food Waste Prevention Technologies’, Resources, Conservation and Recycling, Vol.164, pp.105114.
14. Annosi, M.C., Brunetta, F. and Barlattani, M. (2021) ‘Digitalization Within Food Supply Chains to Prevent Food Waste: Drivers, Barriers and Collaboration Practices’, Industrial Marketing Management, Vol.93, pp.208–220.
15. Bajželj, B., et al. (2020) ‘The Role of Reducing Food Waste for Resilient Food Systems’, Ecosystem Services, Vol.45, pp.101140.
16. Read, Q.D., et al. (2020) ‘Assessing the Environmental Impacts of Halving Food Loss and Waste Along the Food Supply Chain’, Science of the Total Environment, Vol.712, pp.136255.
17. Harvey, J., Smith, S. and Golightly, D. (2020) ‘Food Sharing, Redistribution, and Waste Reduction via Mobile Applications: A Social Network Analysis’, Industrial Marketing Management, Vol.88, pp.437–448.
18. Kruthika V, Lavanya H.R, Mahalakshmi, Ranju P.S.R, Ms. H.L Priyanka, Ms. K.S Sindhu“FOOD WASTE MANAGEMENT SYSTEM IN THE MIDST OF A FOOD CRISIS” IRJMETS.(2023)
19. Moral signalling through donations of money and time .(May -2022). Samuel G.B Johnson a b c, Seo Young Park b