

Foodsphere Management System

A. LAVANYA #1, KUSHAAL R#2, NANDHISH L#3

#1 Professor, Adhiyamaan College of Engineering(Autonomous), Hosur #2,3 UG Students, Adhiyamaan College of Engineering(Autonomous), Hosur

Abstract: *The Food Donation and Management System is a smart and socially driven platform designed to collect, manage, and distribute excess cooked and raw food from college hostels, restaurants, parties, and other events to NGOs, charities, and animal shelters in need. This system aims to minimize food waste and bridge the gap between surplus and scarcity by channeling leftover food both cooked and raw items such as vegetables, fruits, rice, and meat towards organizations that require them for daily meal preparation. It features an intuitive interface for donors to register food donations, specifying type, quantity, and freshness, while NGOs and charities can request food based on availability and need. A built-in transportation and delivery tracking module ensures timely pickups and drop-offs, with live tracking, order numbers, and verification upon delivery. The system includes a feedback mechanism for recipients and donors to share their experience, helping to improve service quality and accountability. By fostering collaboration among food providers and social welfare organizations, this platform not only supports hunger relief but also promotes responsible food handling and sustainability. Through smart logistics, real time coordination, and community engagement, the system turns potential waste into hope for those in need.*

Keywords: Food Donation, Food Waste Management, Surplus Food Redistribution, NGO Collaboration. Delivery Management, Smart Logistics, Social Welfare

I. INTRODUCTION

Food wastage and hunger are two of the most pressing challenges facing modern society. Every day, tons of edible food are discarded from restaurants, college hostels, events, and households, while millions of people remain undernourished. The lack of a structured and transparent food redistribution mechanism results in a major imbalance between food surplus and scarcity. Although several organizations and charities aim to bridge this gap, manual coordination and communication still dominate the process, leading to inefficiency, delays, and avoidable wastage.

The Food Donation and Management System is developed to address these challenges by providing a smart, web-based platform that connects food donors, NGOs, and delivery personnel through a unified digital environment. The system automates the food donation workflow — from registration and approval to transportation, delivery tracking, and feedback collection. Donors can easily log available food by specifying the type, quantity, and freshness, while NGOs and charities can view and request available food based on real-time data. This ensures that food is efficiently redirected from sources of surplus to those in need.

The system also incorporates a built-in delivery and tracking module that facilitates logistics management, enabling real-time updates on food pickups and drop-offs. Each transaction is associated with a unique order number and verification status, ensuring transparency and accountability throughout the process. The addition of a feedback mechanism encourages donors and NGOs to share their experiences, allowing continuous improvement in service quality and reliability.

Technologically, the platform is designed using modern web technologies such as React with TypeScript for the front-end and Indexeddb for database management, authentication, and hosting. These technologies ensure scalability, real-time synchronization, and secure data handling. The system's modular architecture allows seamless

communication among users, automated notifications, and real-time reporting.

By combining digital innovation with social impact, the Food Donation and Management System contributes to sustainability and community welfare. It not only reduces food wastage but also supports NGOs and charitable organizations in delivering quality meals to the underprivileged. Through smart logistics, automation, and transparency, the system turns potential waste into nourishment — fostering a culture of responsibility and compassion within society.

II. LITERATURE SURVEY

The global issue of food wastage and hunger has led to numerous technological innovations aimed at connecting food donors, NGOs, and beneficiaries through intelligent management systems. This chapter reviews relevant literature and research studies that have contributed to the development of efficient food donation and redistribution frameworks.

L. Pimple et al.[1] developed a Food Donation Management System that enables real-time tracking of user data by local administrators. Their system improved transparency and accountability in donation processes; however, it focused mainly on local administrative control without comprehensive automation for donors, NGOs, and delivery personnel.

S. A. Shobika et al. [2] proposed “Bridging Food Surplus to Smiles through Smart Donation and Sustainable Recycling”, introducing an intelligent donation platform for sustainable food redistribution. Their system automated donation requests and approvals but lacked integrated logistics support and multi-role coordination, which are addressed in the proposed FoodSphere Management System.

S. Damavandi et al.[3] examined the use of Blockchain technology in food bank supply chains. The study highlighted how blockchain can enhance trust and traceability among supply chain participants. However, the high implementation complexity and cost make blockchain less practical for small or community-driven donation initiatives.

R. Jaiswal and P. Mehta [4] presented a Smart Food Donation System utilizing Cloud and IoT technologies, emphasizing scalability, automation, and real-time monitoring of donation processes. Their architecture demonstrated how cloud-based infrastructure can improve accessibility and data synchronization between users in different locations.

S. Kaur and N. Sharma [5] designed an Online Food Waste Management System focused on minimizing surplus food from restaurants and events through an integrated web platform. The system successfully improved coordination among stakeholders but lacked mobile accessibility and chatbot assistance for real-time user engagement.

Based on insights from the above studies, the FoodSphere Management System is designed as a scalable, web-based platform integrating React, Node.js, and INDEXDB for real-time data exchange between donors,

NGOs, drivers, and administrators. It bridges the gap identified in prior works by providing a centralized dashboard, live delivery tracking, and automated feedback management, ensuring transparency and efficiency throughout the food donation lifecycle.

III. PROPOSED SYSTEM

The FoodSphere Management System is designed to overcome the limitations of traditional food donation and management methods by Bproviding a centralized, automated, and transparent digital platform that connects donors, NGOs, and logistics partners in real time. The system aims to streamline the entire donation process — from registering surplus food to delivery and feedback collection — through a smart, user-friendly, and efficient interface. In the proposed system, donors such as restaurants, hostels, event organizers, and households can register and list surplus food items by specifying details such as food type, quantity, and freshness level. NGOs and charitable organizations can view and request available donations based on their requirements and proximity. Once a request is approved, the system automatically assigns an available driver or delivery partner to facilitate pickup and delivery, ensuring quick response times and minimizing food spoilage.

A key enhancement of the FoodSphere system is the integration of real-time tracking and monitoring. Using GPS-based location simulation or periodic location updates, both donors and NGOs can track the status of donations — from pickup confirmation to successful delivery. This transparency not only builds trust between stakeholders but also improves accountability and operational efficiency. The inclusion of order numbers, timestamps, and verification codes ensures that every transaction is recorded, validated, and accessible.

The system incorporates role-based dashboards for different users — Donor, NGO, Admin, and Driver — each equipped with specific functionalities. Donors can manage their donation history, NGOs can monitor received and pending donations, admins can oversee operations and assign drivers, and drivers can track pickup and delivery routes. This modular role separation enhances clarity, usability, and data security across all user types.

Technologically, the platform uses React with TypeScript for a responsive and component-driven front-end interface, Vite for fast development and optimized bundling, and IndexedDB as the primary client-side database. IndexedDB allows the system to store and manage large amounts of structured data directly within the user's browser, enabling offline accessibility, fast read/write operations, and seamless synchronization without relying on external cloud services. By using IndexedDB, the system achieves improved performance, reduced dependency on internet connectivity, and enhanced data privacy. Automated notifications and reminders support user engagement by alerting stakeholders about pending pickups, delivery updates, and new donation requests. The integrated feedback and rating mechanism helps maintain service quality by allowing donors and NGOs to share their experiences, enabling continuous improvement.

Overall, the proposed FoodSphere system aims to establish a smart and reliable food redistribution network that ensures surplus food reaches those in need promptly and efficiently. Through automation, real-time data updates, and intelligent routing supported by IndexedDB-driven local storage, the system reduces food wastage, promotes sustainability, and contributes to improved social welfare and community development.

IV. PROPOSED SOLUTION

The FoodSphere Management System proposes a comprehensive, technology-driven solution to address the inefficiencies present in existing food donation frameworks. The system focuses on digital integration, real-time coordination, and role-based automation to create a transparent and sustainable food redistribution network. By connecting food donors, NGOs, and delivery partners through a centralized platform, FoodSphere ensures that surplus food is collected, managed, and delivered to beneficiaries efficiently and safely.

At the core of this solution is a web-based platform developed using modern front-end technologies such as React with TypeScript and IndexedDB for client-side data storage, management, and offline access. IndexedDB replaces cloud-based databases by offering a secure, asynchronous, and high-capacity storage solution directly within the user's browser. This ensures fast performance, reduced server dependency, and improved data privacy. The user interface is designed to be simple, intuitive, and accessible to individuals of all technical levels. Each user category — Donor, NGO, Admin, and Driver — is provided with a customized dashboard containing modules relevant to their operations. This role-based architecture eliminates confusion, improves accountability, and strengthens overall system security.

The proposed solution automates the entire donation workflow. Donors can log in and post available food items by specifying details such as quantity, category, freshness, and pickup address. NGOs can browse available listings, request donations, and track the delivery status. Once a donation request is accepted, the Admin module assigns a nearby driver using predefined logic that selects the closest or most available delivery partner to ensure minimal travel distance and faster delivery time, thereby reducing delays and preventing food spoilage.

A key feature of the system is real-time tracking and monitoring, implemented through periodic location updates or simulated GPS-based data. All stakeholders — donors, NGOs, drivers, and admins — can view the progress of a donation from pickup to delivery, ensuring complete transparency. Upon successful delivery, both the donor and recipient can verify completion using unique order IDs and timestamps. The integrated feedback and rating system allows users to evaluate their experiences, helping to maintain service quality and build trust within the network.

The system also addresses data management challenges by maintaining comprehensive digital records of donations, deliveries, user activity, and feedback inside IndexedDB. These records improve traceability, simplify auditing, and help administrators analyze performance trends over time. In addition, the platform emphasizes food safety by encouraging donors to declare freshness levels, food type, and ideal pickup timelines, enabling NGOs to prioritize perishable items accordingly.

MODULES



V. IMPLEMENTATION

The implementation of the **FoodSphere Management System** involves transforming the system design into a fully functional web-based platform capable of managing food donations, requests, and deliveries in real time. The system is developed using a modular approach, ensuring scalability, maintainability, and efficient data handling. React with TypeScript is used to build the front-end interface due to its component-based architecture and type safety, enabling faster development and reduced runtime errors. The Vite build tool further enhances performance with fast Hot Module Replacement (HMR), optimized bundling, and minimal configuration overhead.

The application logic and data operations are managed using **IndexedDB**, a powerful client-side storage mechanism built into modern browsers. IndexedDB is used to store user profiles, donation entries, NGO requests, driver assignments, delivery logs, and feedback records. Its asynchronous, non-relational data structure allows quick read and write operations without dependency on external servers. The use of IndexedDB ensures that operations such as listing donations, submitting requests, updating delivery status, and storing feedback remain fast and accessible even during low connectivity conditions.

Role-based dashboards were implemented to separate functionalities according to user type. The **Donor Dashboard** allows users to post new donations, update food availability, and view previous contributions. The **NGO Dashboard** enables organizations to browse food listings, request donations, track delivery progress, and review historical transactions. The **Driver Dashboard** provides assigned pickup tasks, route instructions, and real-time delivery status updates, while the **Admin Dashboard** consolidates all system data, enabling administrators to verify donations, approve NGO requests, assign drivers, and monitor overall performance.

Real-time status updates are implemented using state management hooks and periodic background synchronization routines. When a donation is requested or delivered, all associated dashboards update automatically through React state changes integrated with IndexedDB queries. Security and integrity are maintained through unique order IDs, timestamps, and verification codes. Additionally, a **Feedback Module** was implemented, allowing donors and NGOs to submit ratings and comments, which are then stored and analyzed to improve service quality.

1. LOGIN MODULE

The User Login Module serves as the secure entry point for all users of the FoodSphere Management System, including Donors, NGOs, Drivers, and Admins. This module authenticates users by verifying their credentials and determining their assigned roles. Upon successful verification, the system routes them to the appropriate dashboard tailored to their responsibilities. If the entered credentials are incorrect, an error alert is displayed to prevent unauthorized access. This module ensures that only legitimate users can interact with the system, thereby safeguarding data privacy and maintaining secure access control.



Fig 1.2 Login

2. DONOR MODULE

The Donation Management Module enables donors to register and manage surplus food donations. Through an intuitive interface, donors can provide detailed information such as food type, quantity, freshness level, expiry time, and pickup location. Once submitted, the donation is stored in IndexedDB with a pending status, making it visible to NGOs for selection. Donors can also track previously posted donations and update details when necessary. This module ensures that all surplus food is recorded in a structured format and made readily available for organizations that require it.



Fig 1.2 Donor dashboard

3. NGO Request Module

The NGO Request Module provides NGOs with a transparent and organized interface to view available food donations and request items based on their needs. NGOs can browse donation listings, review details, and place requests with a single action. Once a request is made, the system updates the donation status to "Requested" and notifies the admin for approval. NGOs can also track the progress of their requested donations, including driver assignment, pickup confirmation, transit updates, and final delivery. This module ensures fair access to donations and efficient request handling.



Fig 1.3 NGO Request Module

4. Admin Management Module

The Admin Management Module acts as the operational backbone of the FoodSphere system. It provides administrators with full control over donations, NGO requests, driver assignments, and feedback management. Through a centralized dashboard, the admin can verify new donations, approve NGO requests, assign available drivers, and monitor the delivery journey from start to finish. The system also allows admins to review feedback, manage user accounts, and generate analytical reports for performance evaluation. This module ensures smooth system operation, transparency in workflow, and efficient coordination among all stakeholders.



Fig 1.4 Admin Management Module

5. Driver Module

The Driver Module plays a crucial role in managing the transportation and delivery of food donations within the FoodSphere Management System. This module provides drivers with a dedicated interface where they can view all donation tasks assigned to them by the admin. Each task includes essential details such as donor location, NGO destination, food type, quantity. When a driver begins a task, they update the pickup status, which automatically changes the delivery state to "In Transit." Throughout the delivery process, the driver can update progress in real time, allowing donors, NGOs, and the admin to track the current status. Upon reaching the NGO, the driver confirms the delivery using an OTP or confirmation modal provided by the recipient. This confirmation updates the donation status to "Delivered," completing the workflow. The Driver Module ensures timely, efficient, and transparent transportation of food donations, reduces delays, and maintains accountability in the food distribution lifecycle.



Fig 1.5 Driver Module

6. Feedback and Notification Module

The Feedback and Notification Module enhances user engagement and system accountability by capturing satisfaction ratings and providing real-time alerts. After each successful delivery, donors and NGOs receive a prompt to submit feedback, including ratings and optional comments. These feedback entries are stored in IndexedDB and made available to the admin for quality assessment and system improvements. The notification system generates instant alerts for key events, such as new donations, NGO requests, driver assignments, and delivery status changes. Time-based reminders also notify users about expiring food items or pending actions. This module ensures continuous communication and encourages consistent service improvement.



Fig 1.6. Feedback and Notification Module

VI. CONCLUSION

The FoodSphere Management System was developed to bridge the gap between surplus and scarcity by connecting food donors, NGOs, and delivery drivers through a single digital platform. The system successfully streamlines the process of food donation, request handling, and delivery tracking, ensuring that excess food reaches the people and organizations that need it most. By integrating multiple roles such as Donor, NGO, Driver, and Admin, the application promotes collaboration, accountability, and efficiency in food distribution. Each module is designed with a clear workflow — from donor registration and NGO requests to driver assignment, delivery confirmation, and feedback collection — ensuring that every stage of the process is transparent and traceable. The use of technologies such as React, TypeScript, Firebase, and Tailwind CSS has resulted in a responsive, fast, and secure web application that enhances user experience. The system not only minimizes food wastage but also contributes to social welfare by redistributing surplus food to those in need. Overall, the FoodSphere Management System demonstrates how technology can be used effectively for humanitarian and sustainability goals, transforming potential food waste into nourishment for the underprivileged.

VII. REFERENCES

1. Pimple, L., Ambulkar, S., Sandalwar, V., Mendhe, B., & Dadmal, H. (2025). *Food Donation Management System with Real-Time User Data Tracking by Local Admin*. International Journal on Advanced Electrical and Computer Engineering, 14(1), 145–151.
2. Shobika, S. A., Dharshini, T. S., Sruthi, K. R., Parthasarathy, S., Amali, S. M. J., Kanchana, J. S., & Thangasankaran, R. (2025). *Bridging Food Surplus to Smiles through Smart Donation and Sustainable Recycling*. IJRASET Journal for Research in Applied Science and Engineering Technology.
3. Damavandi, S., Berardi, L., & Abbasi, S. (2025). *Blockchain Technology Adoption in Food Bank Supply Chains: A Rough DEMATEL-Based Approach*. arXiv preprint.
4. Jaiswal, R., & Mehta, P. (2022). *Smart Food Donation System Using Cloud and IoT Technologies*. International Journal of Advanced Research in Computer Science and Software Engineering, 12(3), 45–52.
5. Park, J., & Kim, H. (2022). *A data-driven approach for reducing food waste using real-time inventory systems*. Journal of Cleaner Production, 330, 129870.
6. Kaur, S., & Sharma, N. (2021). *Design and Implementation of an Online Food Waste Management System*. International Journal of Innovative Technology and Exploring Engineering, 10(8), 120–126.
7. Lewis, A., & Stewart, D. (2021). *GIS and web-based mapping for improving food redistribution logistics*. Journal of Urban Planning and Development, 147(3), 1–11.
8. Flores, M., & Han, J. (2021). *Sustainable food management using digital platforms: Opportunities and challenges*. Environmental Technology & Innovation, 23, 101678.
9. Ahmed, F., Rahman, M., & Chowdhury, S. (2020). *Smart food waste management system using web and mobile-based technologies*. International Journal of Scientific & Technology Research, 9(3), 512–518.
10. Menon, T., & Venkatesh, S. (2020). *Automation of food donation networks using IoT and intelligent routing*. International Journal of Innovative Science and Research Technology, 5(2), 980–987.
11. Singh, R., & Yadav, S. (2020). *Web-based volunteer and donation coordination system for social welfare organizations*. International Journal of Computer Applications, 176(32), 10–16.