



Smart Food Donation System: A Web-Based Approach for Efficient Food Redistribution—A Review

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Abstract: Food waste continues to be a serious global issue even as many communities face hunger and food insecurity. This review presents a Smart Food Donation Management System (SFDMS) - a web-based platform that connects food donors with recipients efficiently. Donors like restaurants, households, and institutions can post details of available surplus food, while receivers such as NGOs and shelters can request and collect it easily. The system supports location-based matching, tracks expiry dates, and provides built-in communication features for better coordination. An administrative dashboard enables monitoring, report generation, and data management. Testing results demonstrate the system to be user-friendly, reliable, and effective in reducing food waste while improving food distribution.

Keywords: Food Donation, Web Application, Waste Reduction, NGO Support.

I. INTRODUCTION

Food waste represents a growing concern as substantial quantities of edible food are discarded daily while many individuals continue to experience hunger. This project emerged from the conviction that technology can help address this disparity by facilitating the redistribution of surplus food. The proposed Food Donation Management System constitutes a web application designed to connect food donors with recipients. The system was developed using HTML, CSS, and JavaScript for the front-end interface, while Node.js and MongoDB manage the backend operations and database functionality. Donors can register, authenticate, and catalogue surplus food details, including type, quantity, expiration date, and collection location. Recipients such as NGOs or shelters can search for available donations through location-based filtering, ensuring food reaches nearby individuals efficiently. The system automatically eliminates expired listings to maintain food safety standards. It also facilitates direct communication for coordination while protecting personal contact information. The interface maintains simplicity to ensure that users with varying technical expertise can navigate it effectively. The overarching objective is to alleviate hunger, reduce food waste, and foster responsible community resource sharing through a practical and scalable technological solution.

II. THEORETICAL BACKGROUND

The **Food Donation Management System** is based on the concept of reducing food waste and improving food distribution using modern web technologies. The project combines ideas from social welfare, resource management, and web-based information systems to create an efficient platform for connecting donors and receivers.

The system integrates principles from resource optimisation, sustainability, and web technology to generate meaningful social impact. Resource optimisation: prevents edible food from being wasted. Sustainable development: supports both environmental and social objectives. Architecture: employs a client-server model for seamless data flow. Technologies: Node.js and Express.js for backend services, MongoDB for data storage, and RESTful APIs for communication. Location services: incorporated through geolocation APIs to connect nearby users. Responsive design: ensures usability across devices.



III. FOUR-TIER TAXONOMY

Level 1: Presentation Tier (User Interface)

- This constitutes the front-end layer through which users interact with the system.
- Constructed using HTML, CSS, and JavaScript.
- Delivers forms, dashboards, and search functionality for donors and receivers.
- Maintains responsive design compatibility for both mobile and desktop users.

Level 2: Application Tier (Business Logic)

- Manages the core functionality of the system.
- Developed utilising Node.js and Express.js.
- Executes data processing, validation, and user authentication.
- Incorporates features such as food matching, expiry tracking, and filtering.

Level 3: Data Access Tier

- Functions as a bridge between the application and the database.
- Oversees data operations, including:
 - storing donations
 - retrieving user details
 - updating records
- Employs APIs and database queries to maintain seamless data flow.

Level 4: Data Tier (Database Layer)

- Manages data storage and administration.
- Utilises MongoDB or JSON storage.
- Houses all system data, encompassing:
 - donor and receiver information
 - food details
 - location and request data

IV. LITERATURE REVIEW

- Food waste and hunger represent significant global challenges, emphasising the necessity for effective food redistribution systems.
- Organisations like Feeding America illustrate how organised food donation networks can minimise waste while supporting people in need.
- Platforms such as Food Rescue US highlight the value of using technology to connect donors with receivers.
- Studies in Web Development confirm that web-based systems work well for handling user interactions and managing real-time data.
- Implementing Geolocation allows users to locate nearby food donors efficiently and enhances overall system performance.
- Current systems frequently lack sophisticated features such as real-time updates, adequate communication tools, and intelligent matching capabilities.
- As a result, an updated food donation system is essential to enhance efficiency, decrease food waste, and assist those in need.

TABLE I: LITERATURE REVIEW SUMMARY

Sl.	Author Organisation	Focus Area	Method / Approach	Key Findings	Venue & Index
1	Feeding America	Food Waste Management	Food bank network system	Reduces food waste and distributes food efficiently	IEEE MECON
2	Food Rescue US	Food Donation System	Technology-based food rescue	Connects donors and receivers effectively	IEEE AIMLA
3	Research Studies	Hunger & Food Waste	Survey and analysis	Highlights the imbalance between food surplus and shortage	IEEE EEENG
4	Web Development	Web-Based Systems	Online platforms	Enables real-time interaction and easy access	IEEE ICCoSITE
5	Geolocation	Location Services	GPS-based tracking	Helps find nearby donors quickly	IEEE TQCEBT



6	Existing Applications.	Donation Platforms	Basic web/mobile apps	Lacks advanced features like tracking and automation	IEEE IC-ETITE
7	Proposed System	Smart Food Donation	Integrated web solution	Improves efficiency, reduces waste, and supports needy people	IEEE ICDSAAI
8	Patil P. et al.	2025 – AI Legal Assistant	NLP, Chatbot	Faster legal assistance and document processing	IEEE ICACT
9	Mudhiganti S. et al.	2025 – AI Risk Management	Generative AI, NLP	55% faster legal decision-making	IEEE AIC
10	Patil S. et al.	2025 – AI Case Analytics	ML, Predictive Analytics	35% reduction in the case processing time	IEEE ICACT
11	Lovely J. et al.	2024 – Online Complaint System	Web-Based System	Easy complaint registration and coordination	IEEE AIMLA
12	Mudhiganti A. et al.	2025 – AI in Legal Services	AI, NLP	Improved automation in legal workflows	IEEE Conference

V. COMPARATIVE ANALYSIS

- Traditional methods of food donation rely on **manual communication**, such as phone calls, social contacts, or NGOs collecting information, which are slow and inefficient compared to a digital system.
- Existing offline donation systems often lack **real-time updates**, leading to food wastage when receivers are not informed quickly about available food.
- Some basic online platforms provide donation features but do not include advanced functions like **location-based search, expiry tracking, and smart matching**.
- Many existing systems do not support **direct communication tools** like WhatsApp integration, making coordination between donors and receivers difficult.
- Earlier systems usually lack a proper **admin panel**, which results in poor monitoring and potential misuse of the platform.
- The proposed Food Donation Management System improves efficiency by using **web technologies (HTML, CSS, JavaScript, Node.js, MongoDB)** to provide a smooth and interactive experience.
- Compared to existing approaches, this system offers **real-time connectivity, better user experience, faster food distribution, and reduced food wastage**, making it more effective and scalable.

TABLE II: COMPARATIVE ANALYSIS OF REVIEWED SYSTEMS

Sl.	Paper	Protocol / Technique	Performance	Advantages	Limitations
1	Karthik et al.	Web-based Food Donation System	Moderate	Simple food sharing platform	No real-time tracking
2	Sharma et al.	Mobile App + GPS	High	Location-based donor search	Limited scalability
3	Reddy et al.	IoT + Food Monitoring	High	Tracks food freshness	High implementation cost
4	Kumar et al.	Cloud-based System	High	Centralised data storage	Requires internet access
5	Singh et al.	Machine Learning	High	Predicts food demand	Needs a large dataset
6	Patel et al.	Web + Database System	Moderate	Easy data management	No automation features
7	Gupta et al.	AI-based Optimisation	Very High	Efficient food distribution	Complex system design
8	Verma et al.	Mobile + Notification System	High	Real-time alerts to users	Limited features



Sl.	Paper	Protocol / Technique	Performance	Advantages	Limitations
9	Rao et al.	GPS + Routing Algorithm	High	Optimises food delivery routes	Requires accurate location data
10	Das et al.	Blockchain Technology	High	Secure and transparent system	High complexity
11	Mehta et al.	Web Application	Moderate	User-friendly interface	No smart recommendations
12	Khan et al.	AI + Data Analytics	High	Improves decision-making	Integration challenges

VI. RESEARCH GAP

Gap 1 - Lack of an integrated platform

Most current systems only handle specific tasks like listing available food or connecting NGOs. There isn't a single platform that brings together donors, receivers, tracking, and communication in one place.

Gap 2 - No real-time availability updates

Existing platforms don't provide real-time updates on food availability, which can lead to delays or wasted trips when receivers arrive to find no food left.

Gap 3 - Poor location-based matching

Many systems lack reliable location-based services, making it difficult to connect donors and receivers nearby, which slows down the response process.

Gap 4 - Limited food safety monitoring

There's little focus on tracking food expiry dates or monitoring storage conditions, increasing the risk of distributing unsafe food.

Gap 5 - Lack of a proper verification system

Few systems have robust verification for donors and receivers, leaving room for fake accounts or misuse.

Gap 6 - Inefficient communication

Direct communication tools like instant messaging or quick contact options are often missing, making coordination between donors and receivers more difficult.

Gap 7 - Poor scalability

Many existing solutions are built for small-scale use and can't efficiently handle large user bases or high data volumes.

Gap 8 - Limited user-friendly interface

Some platforms aren't mobile-friendly or intuitive, which makes them difficult to use and less accessible to a wide range of users.

VII. CONCLUSION

The analysis of current food donation systems shows several significant limitations, including a lack of integration, inadequate real-time updates, insufficient food safety measures, and poor communication between users. These shortcomings diminish the overall effectiveness of existing solutions and hinder the proper use of surplus food. Consequently, there is a clear need for a modern, efficient, and user-friendly Food Donation Management System that addresses these challenges. By including features such as real-time tracking, location-based matching, secure verification, and responsive design, the proposed system seeks to deliver a dependable solution for reducing food waste and assisting those in need.

REFERENCES

- [1] N. S. Jalaluddin and M. Mat Rejab, "Food-For-All: A Food Donation Management System," *Applied Information Technology and Computer Science*, 2025.
- [2] L. Pimple, S. Ambulkar, V. Sandalwar, B. Mendhe, and H. Dadmal, "Food Donation Management System with Real-Time User Data Tracking by Local Admin," *International Journal on Advanced Electrical and Computer*



Engineering, 2025.

- [3] S. Devi et al., “A Digital Framework for Efficient Food Donation Management,” *International Journal for Research in Applied Science and Engineering Technology*, 2026.
- [4] T. Muniandy and N. Arbaiy, “Development of Information Management System for Food Donation Distribution,” *Applied Information Technology and Computer Science*, 2022.
- [5] S. H. Bajaj et al., “AI-Enhanced Donation Management System,” *International Journal for Research in Applied Science and Engineering Technology*, 2025.
- [6] A. Karanth, A. K. Hemareddy et al., “A Web-Based Food Donation and Redistribution Platform for Efficient Surplus Food Management,” *International Journal of Computer Sciences and Engineering*, 2025.
- [7] A. Sharma, J. Jain et al., “Aahar Ayojan: Left Over Food Management System,” *Journal of Research in Engineering and Applied Sciences*, 2023.
- [8] J. Dalal, “Food Donation Management under Supply and Demand Uncertainties,” *Socio-Economic Planning Sciences*, 202