

FOODLINK – A Web-Based Platform for Efficient Food Waste Management and Redistribution

Dr.M.Jaithoon Bibi^{#1}, K.Dharsan ^{*2}

^{#1}Assistant Professor,Department of Computer Science with Cognitivve Systems,Sri Ramakrishna college of Arts & Science, Coimbatore, Tamilnadu,India.

^{#2}Student of Computer Science with Cognitive Systems, Sri Ramakrishna College of Arts & Science, Coimbatore, Tamilnadu, India.

¹jaithoonbibi@srcas.ac.in, ²k.dharsan007@gmail.com

Abstract:

Food waste has become a serious global issue affecting environmental sustainability and food security. Large quantities of edible food are discarded by restaurants, supermarkets, and event organizers, while many people suffer from hunger. The absence of a centralized system for managing surplus food distribution leads to inefficient coordination between donors and organizations serving needy communities.

This paper proposes FOODLINK – A Web-Based Food Waste Management Platform that connects food donors, NGOs, volunteers, and administrators through a centralized digital system. The platform allows donors to post surplus food details such as quantity, type, location, and availability time. NGOs and volunteers can view these donations and arrange timely collection and distribution.

The system is developed using React.js for the frontend, Node.js and Express.js for backend services, and MongoDB for database management. Role-based authentication using JSON Web Tokens ensures secure access to the platform. Features such as donation tracking, request management, and real-time status updates improve transparency and operational efficiency.

The proposed platform reduces food wastage, improves coordination between stakeholders, and contributes toward sustainable food redistribution. The system demonstrates how modern web technologies can be applied to address real-world social challenges.

Keywords—Food Waste Management, Web Application, Food Donation Platform, Role-Based Access Control, MongoDB, Node.js, React.js.

I. INTRODUCTION

Food waste is one of the major global challenges affecting environmental sustainability, economic efficiency, and social welfare. Every year, millions of tons of edible food are discarded by restaurants, hotels, supermarkets, and event organizers. At the same time, a significant portion of the population suffers from hunger and malnutrition.

One of the primary reasons for food wastage is the lack of an efficient communication mechanism between food donors and organizations that distribute food to needy people. Surplus food is often discarded because donors are unaware of nearby NGOs or volunteers who can collect and distribute the food in time.

To address this problem, this research proposes FOODLINK – A Web-Based Food Waste Management Platform. The system provides a centralized digital platform that connects food donors, NGOs, volunteers, and administrators. Donors can upload details of surplus food, while NGOs and volunteers can view available donations and coordinate pickups.

The system aims to reduce food wastage, improve food redistribution efficiency, and enhance transparency in the donation process using modern web technologies and secure authentication mechanisms.

II. LITERATURE SURVEY

Several studies have explored the use of technology for improving food distribution and reducing food waste.

Smith et al. (2018) proposed a web-based food donation platform that connects restaurants with local charities. Their research demonstrated that digital systems can significantly reduce food wastage by improving communication between donors and receivers.

Gupta and Sharma (2020) studied food redistribution systems and emphasized the importance of centralized platforms for managing food donations and tracking distribution activities. Their work highlighted the need for real-time tracking and database-driven management systems.

Rahman et al. (2021) developed a mobile application for food donation that allows users to donate leftover food. Although the system improved accessibility, it lacked advanced tracking mechanisms and administrative control.

Recent research shows that integrating full-stack web technologies with role-based authentication and centralized databases can significantly improve the efficiency and reliability of food donation systems.

However, many existing solutions lack proper coordination between donors, NGOs, volunteers, and administrators within a single unified platform.

The proposed system, FOODLINK, addresses this gap by providing a centralized web-based platform with secure authentication, donation tracking, and role-based access control.

III. PROBLEM STATEMENT

Despite the increasing awareness of food waste issues, surplus food management remains inefficient due to several challenges.

- First, many food donations are managed through manual communication methods such as phone calls or social media posts, which are unreliable and time-consuming.

- Second, there is no centralized system for managing food donation records, making it difficult to track donation history and distribution status.
- Third, delays in communication often lead to food spoilage before it can be collected and distributed.
- Finally, the absence of proper monitoring mechanisms reduces transparency in the food donation process.

Therefore, there is a need for a secure, centralized, and automated system that can connect food donors, NGOs, volunteers, and administrators to manage food donations efficiently.

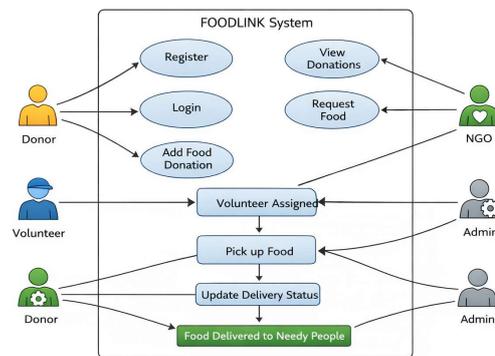


Fig. 3. Use Case Diagram of FOODLINK System

Fig. 3. Use Case Diagram of FOODLINK System

IV. PROPOSED SYSTEM ARCHITECTURE

The FOODLINK platform follows a three-tier architecture consisting of:

Presentation Layer

The frontend interface is developed using React.js, providing a responsive and user-friendly interface for donors, NGOs, volunteers, and administrators.

Application Layer

The backend is developed using Node.js and Express.js, which handle business logic, user authentication, and API communication.

Data Layer

The database is implemented using MongoDB, which stores user details, food donations, request records, and delivery tracking information.

The system workflow includes:

User Registration → Authentication → Food Donation Posting → NGO Request → Volunteer Pickup → Delivery Confirmation → Status Update

Role-based access control ensures that each user type can access only authorized features.

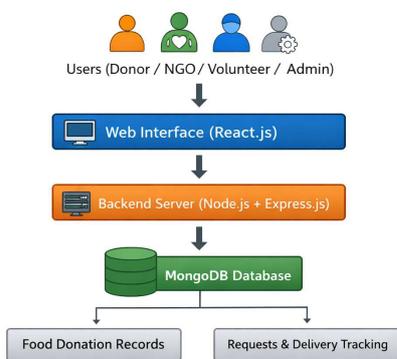


Fig. 1. System Architecture of FOODLINK Platform.

Fig. 1. System Architecture of FOODLINK Platform



Fig. 2. Workflow of FOODLINK Food Donation Process

Fig. 2. Workflow of FOODLINK Food Donation Process

V. IMPLEMENTATION AND TECHNOLOGIES

The FOODLINK platform was implemented using modern full-stack web development technologies.

Frontend

The user interface was developed using React.js, HTML, CSS, and JavaScript. The frontend provides role-based dashboards for donors, NGOs, volunteers, and administrators.

Backend

The backend server was implemented using Node.js with Express.js. RESTful APIs were developed to handle authentication, donation management, request processing, and status updates.

Database

The system uses MongoDB, a NoSQL database that provides flexible document-based data storage. Data models were defined using the Mongoose library to enforce schema validation.

Security Mechanisms

Several security mechanisms were implemented:

- Password encryption using hashing techniques
- JWT-based authentication
- Role-based access control
- Input validation and error handling

These features ensure secure system operation and protection of user data.

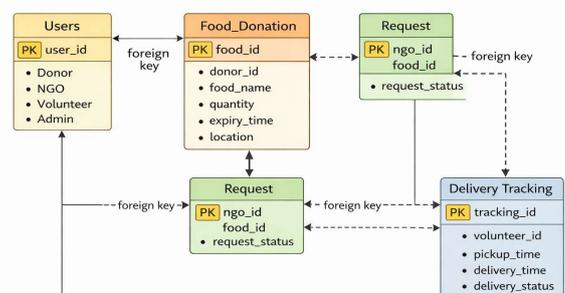


Fig. 4. Database Schema of FOODLINK System

Fig. 4. Database Schema of FOODLINK System

VI. RESULTS AND DISCUSSION

The FOODLINK platform was tested with multiple users representing donors, NGOs, volunteers, and administrators.

The system successfully supported the following operations:

- Donors posting surplus food donations
- NGOs viewing and requesting available food
- Volunteers updating pickup and delivery status
- Administrators monitoring donation records

Testing results indicated that the platform significantly improves coordination between stakeholders and reduces delays in food redistribution. The digital system eliminates manual communication barriers and ensures transparency through real-time status updates.

The platform demonstrated high reliability, efficient data handling, and scalability for larger user bases.

VII. CONCLUSION

This research presented FOODLINK – A Web-Based Food Waste Management Platform

designed to reduce food wastage and improve food redistribution efficiency. The system connects food donors, NGOs, volunteers, and administrators through a centralized digital platform.

By implementing role-based authentication, real-time donation tracking, and efficient data management, the platform enhances transparency and coordination in the food donation process.

The system demonstrates how modern web technologies can be used to address real-world social challenges such as food waste and hunger. Future improvements may include mobile application support, real-time notifications, GPS-based delivery tracking, and advanced analytics dashboards.

REFERENCES

- [1] Node.js Documentation – <https://nodejs.org>
- [2] Express.js Documentation – <https://expressjs.com>
- [3] MongoDB Documentation – <https://www.mongodb.com>
- [4] MDN Web Docs – <https://developer.mozilla.org>
- [5] Sommerville, I., Software Engineering, Pearson Education.
- [6] Pressman, R., Software Engineering: A Practitioner's Approach.