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Food Bridge AI-powered Food Redistribution Using Distance-Based ML Matching

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Abstract
Food Bridge is a technology-enabled social platform created to reduce food wastage and combat hunger by connecting surplus food providers with individuals and organizations in need. The system allows restaurants, hotels, hostels, catering services, event organizers, and households to easily post details about excess edible food through a mobile or web application. Nearby NGOs, shelters, orphanages, old-age homes, community kitchens, and verified volunteers receive real-time, location-based notifications, enabling quick collection and timely distribution before the food spoils. By streamlining communication with instant alerts, smart matching, and basic verification features, Food Bridge ensures efficiency, transparency, and food safety throughout the redistribution process. The platform replaces unorganized manual methods with a structured digital workflow, making food sharing reliable and scalable. In addition to addressing immediate hunger, Food Bridge promotes environmental sustainability by minimizing food waste, reducing landfill usage, and lowering carbon emissions. It also encourages social responsibility and community participation by raising awareness about responsible consumption and surplus food management. Designed to be adaptable and scalable, Food Bridge can be implemented across institutions, cities, and regions, supporting long-term goals such as zero hunger and responsible consumption.
Keywords: *Community participation; Environmental sustainability; Food redistribution; Hunger reduction; Real-time notifications.*

1. Introduction
Food wastage and hunger are two major social challenges that exist together despite improvements in food production and distribution systems. A significant amount of edible food is wasted every day by restaurants, hotels, hostels, event organizers, and households due to poor coordination, lack of awareness, and the absence of an efficient redistribution mechanism. At the same time, many underprivileged individuals and communities continue to face food insecurity and depend on irregular support from NGOs and charitable organizations. The Introduction Recent research highlights that modern web-based applications provide real-time communication, scalability, and accessibility, making them suitable for social welfare solutions (Kumar, A et al., 2022; Sharma, P et al., 2023; Patel, R et al., 2024;). Similarly, technology-enabled food donation platforms have been identified as effective tools for reducing food waste and improving food security through instant alerts, location-based matching, and verified workflows (Nair, P et al., 2024; Singh, A et al., 2024;). In this context, the proposed Food Bridge system introduces a reliable, transparent, and scalable digital solution that connects surplus food providers with individuals and organizations in need. The platform ensures timely redistribution before food spoils, supports food safety, and promotes sustainable utilization of resources. The originality of this work lies in integrating modern full-stack web technologies with

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a socially responsible workflow to address hunger reduction, environmental sustainability, and responsible consumption (Mehta, S et al., 2025; Verma, A et al., 2025;).

1.1. Current Issues in Food Redistribution

In today's society, a significant amount of edible food is wasted daily due to poor coordination, lack of awareness, and the absence of efficient redistribution systems. Restaurants, hotels, hostels, catering services, and households often discard surplus food because there is no structured mechanism to share it with those in need. At the same time, many people continue to struggle with hunger and food insecurity, relying on irregular support from NGOs and charitable organizations (Patel, S et al., 2024; Kumar, R et al., 2024;). Therefore, there is a critical need for a transparent and technology-driven solution that links surplus food sources with recipients, ensuring timely redistribution, food safety, and sustainable utilization of resources (Verma, A et al., 2025; Chatterjee, M et al., 2025;).

1.2. Purpose and Major Target of the Project

The Food Bridge project is important because it addresses food wastage and hunger through a practical technology-enabled solution. By enabling timely redistribution of surplus edible food, the platform ensures that food reaches underprivileged individuals instead of being wasted. This supports vulnerable communities and promotes environmental sustainability by reducing landfill waste and carbon emissions (Mehta, S et al., 2025; Sharma, R et al., 2025;). Food Bridge aims to redirect surplus food efficiently, provide access to nutritious meals for shelters and NGOs, connect donors and recipients through instant notifications, and maintain accountability by tracking food donation and distribution status.

2. Method

The Food Bridge system was developed using a web-based methodology to enable efficient redistribution of surplus food from donors to recipients. The platform allows restaurants, hotels, households, and event organizers to post details about excess edible food through a simple online interface. Nearby NGOs, shelters, and verified volunteers receive real-time, location-based notifications, ensuring quick collection and timely distribution before the food spoils. The system follows a structured workflow that includes user registration, food listing, recipient matching, pickup coordination, and delivery confirmation. Authentication and basic verification features are included to improve transparency, trust, and food safety. The development approach integrates modern full-stack technologies and real-time communication techniques to ensure scalability, reliability, and effective coordination among all stakeholders.

Table 1. Key Modules and Technologies Used in Food Bridge

Component	Technology
Frontend Interface	React.js, HTML, CSS
Backend Services	Node.js, Express.js
Database Management	MongoDB/MYSQL
Real-Time Notifications	Location-based alert system
User Authentication	Secure login and role verificator
Donation Tracking	Status monitoring and reporting

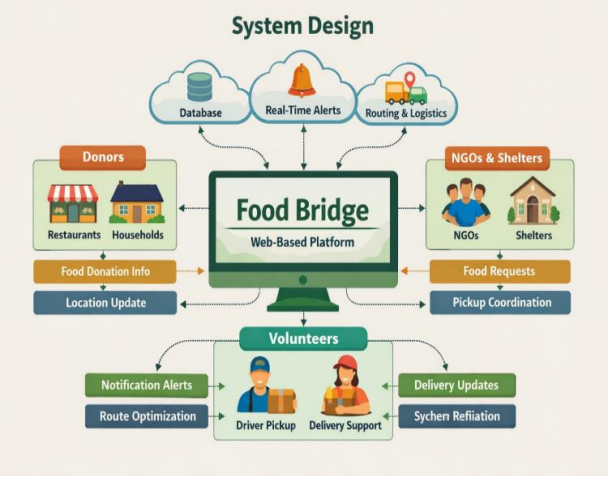

Figure 1 System design of the Food Bridge

3. Results and Discussion

3.1.Results

The Food Bridge system was successfully designed and implemented as a web-based platform to reduce food wastage and improve food redistribution. The system enables food donors such as restaurants,

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hotels, households, and event organizers to post surplus edible food details along with location information. The platform generates real-time alerts to nearby NGOs, shelters, and verified volunteers, allowing quick response and timely collection. The donation workflow includes food listing, recipient matching, pickup coordination, delivery confirmation, and status tracking. The results demonstrate that the system improves communication between donors and recipients, reduces delays in food pickup, and ensures efficient redistribution before food spoils. Overall, Food Bridge provides an organized and transparent method for managing surplus food donations through digital technology.

3.2.Discussion

The results of the Food Bridge system indicate that technology-driven platforms can play an important role in addressing social issues such as hunger and food wastage. Unlike traditional manual donation practices, Food Bridge offers structured coordination through instant notifications and location-based matching, which increases donation efficiency. The inclusion of volunteer support and delivery updates enhances accountability and trust among stakeholders. The system also promotes sustainability by reducing landfill waste and minimizing environmental impact. These findings highlight that a scalable digital workflow can strengthen community participation, improve food accessibility for underprivileged groups, and support long-term goals such as responsible consumption and zero hunger.

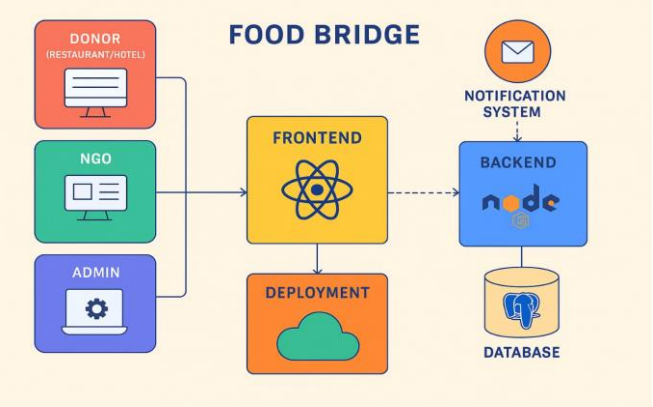

Figure 2 Flow Diagram for Food Bridge

Conclusion

The Food Bridge project confirms that surplus food wastage and hunger can be effectively addressed through a reliable and technology-enabled redistribution platform. The system successfully connects food donors with NGOs, shelters, and volunteers, ensuring timely collection and safe distribution of edible food. The results and discussion demonstrate that Food Bridge improves coordination, transparency, and accountability in the donation process while promoting environmental sustainability. Therefore, the proposed platform serves as a practical solution for reducing food waste, supporting vulnerable communities, and encouraging social responsibility through digital innovation.

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References

The Previous studies have explored different approaches to web-based platforms and food donation systems. Sharma et al. [1] discussed the use of modern JavaScript frameworks such as React and Node.js to develop scalable and interactive web applications with real-time updates. Nair et al. [2] introduced a technology-enabled food donation

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system that connects surplus food donors with nearby NGOs through instant notifications, reducing food wastage and improving accessibility. Mehta et al. [3] focused on cloud-based food distribution platforms that support real-time monitoring, scalability, and efficient coordination in food redistribution workflows.

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