Food Donation Management System with Real-Time User Data Tracking by Local Admin

Leena Pimple [1], Sahil Ambulkar [2], Vishal Sandalwar [3], Badal Mendhe[4], Harshal Dadmal[5]

[1] Suryodaya College of Engineering and Technology / Computer Engineering, Nagpur, India
[2-5] Suryodaya College of Engineering and Technology / Computer Engineering, Nagpur, India
sulbhewar.leena@gmail.com[1],   shambulkar@gmail.com[2],   sandalwarvishal7@gmail.com[3],
badalmendhe20@gmail.com[4], harshal.dadmal@gmail.com[5]

Peer Review Information	Abstract
	Food waste and hunger are two global challenges, with one-third of all food produced being wasted while millions suffer from food insecurity. Food waste is a critical issue, with 1.3 billion tons of food wasted annually worldwide, while over 800 million people face hunger. Traditional food donation systems are often fragmented, inefficient, and lack real-time coordination, leading to missed opportunities for redistribution. This paper presents the design, implementation, and evaluation of a food donation system aimed at bridging the gap between surplus food and those in need. Through the system we can see significant reductions in food waste and improved access to nutritious meals for vulnerable populations. The primary objectives of this research are to design and develop a scalable food donation system that optimizes the collection, distribution, and tracking of surplus food. The food donation system results by Reduction in Food Waste: A decrease in food waste among participating donors. Increased Donations: An increase in the volume of donations reaching the local admin. The findings underscore the potential of technology to address food waste and hunger. By streamlining the donation process, the system not only reduces waste but also creates a sustainable model for food redistribution. Challenges include ensuring food safety. Future work will focus on integrating AI for demand prediction and expanding the system to rural and underserved areas.

Introduction

A Food Donation Management System is a tool or platform that helps collect, organize, and distribute leftover or surplus food from businesses like restaurants, supermarkets, or farms to people or organizations in need such as food banks, shelters, or communities. Its main goal is to reduce food waste while addressing hunger. It is a digital platform designed to streamline the process of collecting the food from doner assigning the donation to the local system admin, organizing and distributing the food to those in need. Food Donation Management System is quite simple for user to understand the system because the system is not complex. The system allows user to create user profile, admin profile on a same platform connecting the local charities.

LITERATURE SURVEY

Research indicates that almost one-third of food produced worldwide is wasted, but millions go hungry. The Role of Food Donation: Food donation is proposed by research to bridge the gap between food surplus and food insecurity. Reduction of food waste through donation can lower greenhouse gas emissions and wastage of resources by a significant amount. Some studies describe the use of web and mobile applications to efficiently match donors and recipients (e.g., mobile applications like Too Good To Go and Olio). Some studies mention the use of blockchain technology for traceability and transparency in food donation processes. Suggestions are proposed to use Internet of Things (IoT) sensors to monitor food quality and route optimization. Transportation, storage, and delivery of perishables are mentioned as concerns in research literature. Most nations have laws against food donation due to liability but some countries, such as the United States with the Good Samaritan Act, offer protection under law. Awareness of donors and recipients becomes a recurring theme in the research. Real-Time Matching Systems using algorithms for real-time donor-recipient matching are seen to be more efficient. Inventory Management software that tracks food categories, quantity, and expiration dates is instrumental in reducing waste. User-Friendly Interfaces: Research shows that platforms that are simple and easy to use for both donors and recipients are instrumental. Social Impact studies highlight that food donation systems are instrumental in adding to food security among vulnerable groups. Donating surplus foods can reduce the cost of disposal for businesses while providing savings to charitable organizations at the same time. Reducing food waste through donation minimizes landfill dependence and related emissions, providing environmental gains. Research indicates that almost a third of all food produced worldwide is wasted, while millions go hungry. The Role of Food Donation: Research indicates that food donation helps fill the gap between food surplus and food insecurity. Food waste reduction through donation can significantly lower greenhouse gas emissions and wastage of resources. Various studies explain the use of web and mobile app to effectively match donors and recipients (e.g., mobile apps like Too Good To-Go and Olio). Some studies explain blockchain technology to provide traceability and transparency in food donation systems. Internet of Things (IoT) sensors are suggested to track food quality and routing optimization. Transportation, storage, and on-time delivery of perishable food are issues mentioned in research studies. Most countries have legislation that limits food donation due to liability; however, some countries, like the United States with the Good Samaritan Act, offer protection. Donor and recipient awareness is a common issue in research studies. Real-Time Matching Systems using algorithms to match donors and recipients in real-time are mentioned to be more effective. Inventory Management software to track food types, quantities, and expiration dates is key to waste reduction. User-Friendly Interfaces: Research shows that simple-to-use, easy platforms for both donors and recipients are needed. Social Impact research highlights that food donation systems play a significant role in food security among the vulnerable. Surplus food donation can lower disposal costs to businesses while saving charities money at the same time. Food waste reduction through donation lowers landfill use and related emissions, offering environmental benefits.

PROBLEM STATEMENT

Food waste goes beyond the mere concept of excess or discarded food; it has social and environmental consequences. Food waste in landfills leads to the emission of methane, a highly potent greenhouse gas that contributes significantly to climate change and resource depletion. Energy, water, and land used in producing wasted food are wasted, thus exacerbating the issue of world hunger and food insecurity. Hunger strikes many people, while excess food that ends up in landfills would ease the suffering of the hungry.

Despite the eagerness of most food providers to donate surplus food to charitable organizations or non-governmental organizations (NGOs), the process of donation proves to be inefficient, resulting in missed opportunities. The primary challenge is the lack of coordination needed for scheduling food pickups among food providers, NGOs, and volunteers. The time-sensitive nature of donations is vital in avoiding spoilage; without effective scheduling and communication processes, donated food is not picked up in time, resulting in wastage. Moreover, food providers and NGOs typically lack real-time information regarding available surplus food. Such a lack of instant updates may discourage efficient handling and optimization of food donations, thus resulting in additional missed opportunities to redistribute food prior to spoilage. The process of food wastage is a serious global concern with far-reaching environmental, economic, and social consequences. As estimated by the Food and Agriculture Organization (FAO), approximately one-third of the food produced worldwide is wasted annually, amounting to an astonishing 1.3 billion tons of food wasted annually. This wastage not only represents the

loss of required resources, including water, energy, and land, but also results in environmental degradation. When food waste is disposed of in landfills, it produces methane, a powerful greenhouse gas that is responsible for causing damage to the environment far greater than carbon dioxide. This process further enhances climate change and puts pressure on ecosystems, further degrading biodiversity.

In addition to its environmental impact, food wastage also has a profound impact on economic and social considerations. The production, transportation, and elimination of wasted food are expensive processes, and the funds could be utilized for the fight against food shortages. With millions of people around the world facing hunger and malnutrition, wastage of food that can be eaten is a lost opportunity to feed vulnerable groups of people. In India alone, nearly 40% of food produced is wasted, whereas the majority of the population is faced with food insecurity. The disparity shows the urgency of effective action to bridge the gap between surplus food and people who need it.

Existing food donation systems are inefficient and disorganized, depending on word of mouth and the absence of coordination. Food donors, such as households, hotels, and restaurants, wish to donate excess food, but the process is tainted by logistical obstacles. Uncoordinated collections, real-time information gaps, and complicated logistics often lead to food redistribution chances being lost before the food is wasted. For example, food donors can list products for donation, but without real-time notifications, NGOs and volunteers could not get information about these products in time to pick them up, particularly for perishable products. This inefficiency discourages participation by small and large-scale donors of food, reducing the effectiveness of food donation. In addition, existing food donation platforms are also afflicted by scalability challenges, being restricted to a specific geographic area and lacking functionalities that enable real-time communication and coordination. This geographic constraint diminishes their effectiveness, as food wastage and hunger are global concerns that need extensive solutions. For example, platforms can perform well within particular cities or areas but encounter logistical challenges when expanding to new areas, which

might have diverse regulatory requirements, donor networks, and transportation requirements.

The lack of efficient and scalable food donation infrastructure only complicates the matter, leading to missed opportunities in redirecting excess food to food insecure populations. The use of a centralized online platform that deploys real-time communication and automated processes can profoundly improve food redistributive efforts to address the inextricable dilemmas of hunger and food waste.

OBJECTIVE

The aim of the system for food donation is to minimize food on the one hand and hunger on the other, by creating a simple, easy-to-use app to connect people with extra food with those who are in need. It works as follows:

• *Connecting Donors and Recipients:* The app serves as the communication hub between restaurants, hotels, and households with surplus food, and NGOs, charities, or individuals in need. Users can easily list available food or search for donations in their vicinity.

• *Real-Time Alerts:* The app will notify NGOs or volunteers immediately when a food donation is posted, allowing for immediate pick-up before the food is spoiled. This saves more food while feeding the needy faster.

• *Donation Tracking:* The system keeps information about how much food has been donated and where it goes, and who receives it. This transparency engenders trust and gives donors an avenue to see the impact of their donation.

• *User-Friendly Design:* The app is user-friendly to all—donors, NGOs, and delivery teams—with explicit steps to list food, request donations, or manage deliveries.

• *Work from Anywhere:* The system should be scalable so that it covers more cities or countries while customizing itself according to the local situation as to maximize efficiency in food distribution.

• *Encouraging Community Helping:* The app engenders participation from individuals and businesses by incentivizing them to donate food, thereby sustaining a culture of sharing and minimizing wastage.

METHODOLOGY

To address food waste and hunger, the proposed system follows a structured, step-by-step approach that combines technology, community collaboration, and continuous improvement. Below is a detailed breakdown of the methodology, simplified for clarity:

1. Research and Problem Analysis

• *Data Collection:* The team begins by analyzing food waste patterns and hunger statistics in target
• areas. For example, studying how much food is wasted daily at weddings,

restaurants, or supermarkets, and communities with high food insecurity.

- *Stakeholder Interviews:* Meetings are held with key players like restaurant owners, NGOs, volunteers, and beneficiaries to understand their challenges. For instance, hotels may express difficulty in coordinating donations, while NGOs highlight delays in receiving surplus food.

- *Define Scope:* Based on findings, the project scope is outlined—e.g., focusing on urban areas first or prioritizing perishable food redistribution.

2. System Design and Prototyping

- *User-Centric Design:*

  User Roles: The app is designed for four main users:

  1. Donor: Those who donate food and surplus.
  2. Recipient: Those who will receive the food.
  3. Delivery Personnel: Those who manage the pickups.
  4. Admin: Those who will oversee everything.

- *Features:*

  Donor Interface: Simple forms to upload food details (name, type, quantity, location).

  Recipient Interface: Search filters (e.g., vegetarian, non-vegetarian)

  GPS Integration: Maps show efficient routing.

3. Technology Development name

- *Frontend Development:* The app's interface is designed for ease of use. Buttons like "Donate Now" displayed. Tools like HTML and CSS is used for frontend,

- *Backend Infrastructure:*

Database: MySQL stores user profiles, donation listings, and transaction histories.

Security: Encryption protects sensitive data (e.g., donor addresses), and login authentication prevents
 misuse.

PHP is used for connecting database to frontend

4. Pilot Testing and Feedback Integration

- *Small-Scale Launch:* The app is tested in a limited area (e.g., a single city neighbourhood) with a few partner restaurants and NGOs.

- *Bug Fixes:* Issues like GPS inaccuracies or slow loading times are resolved. For example, optimizing the map feature to reduce battery drain.

- *User Training:* Workshops teach donors how to upload food details in 30 seconds or guide NGOs on

- managing requests.

- *Feedback Loops:* Surveys and interviews gather insights. A restaurant owner might suggest adding bulk upload options for daily donations, leading to feature upgrades.

5. Full-Scale Implementation

- *Public Launch:* Widely distribute the app through such means as social media, partnership agreements with local businesses, and creation of awareness campaigns.

- *Monitoring Tools:* Dashboards track metrics like:

- *Food Saved:* The total kilograms donated daily/weekly.

- *Redistribution Rate:* Percentage of listed food successfully delivered.

- *User Engagement:* Active donors, NGOs, and volunteers.

- *Quality Assurance:* Volunteers inspect food for safety (e.g., rejecting expired items).

  Recipients rate donations (e.g., 5-star system) to ensure quality.

6. Scalability and Expansion

- *Geographic Growth:* After success in one region, the app expands to new cities/countries. Adjustments include multilingual support or local payment gateways for delivery fees.

- *Advanced Features:* AI Predictions: Machine learning analyses historical data to forecast donation

- hotspots (e.g., predicting surplus food after festivals). Gamification: Donors earn badges or discounts for consistent contributions, Encouraging participation.

- *Partnerships:* Collaborate with grocery chains to rescue near-expiry items or with delivery services for low-cost logistics.

7. Community Engagement and Sustainability

- *Volunteer Networks:* Local volunteers are recruited and trained via the application. They receive automated pickup assignments based on availability.

- *Awareness Campaigns:* Host events in Schools and colleges to educate the public on food waste's environmental impact (e.g., "Saving 1 ton of food reduces 4 tons of CO2").

- *Policy Making:* Work with governments to provide incentives for food donators (e.g., tax breaks for participating restaurants).

CLASSIFICATION

System has two option one is USER and another is ADMIN.

- **User:** User have to first register and after that they can sign-in.

 while registration application needs NAME, MAIL-ID, CITY, ADDRESS, PASSWARD.

After sign-in they have option to donate food, after clicking on donate food the application has option like

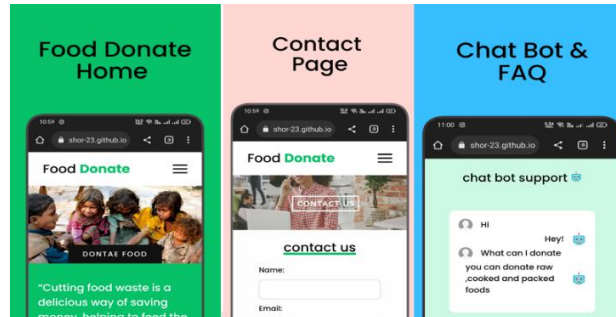 NAME, VEG/NON-VEG, TYPE (raw, cooked, packed), QUANTITY (number of person/kg), PHONE NUMBER.
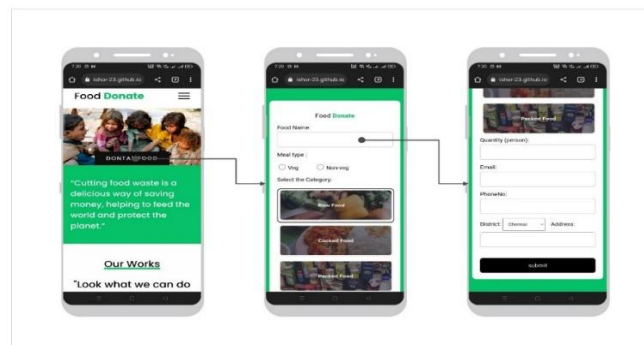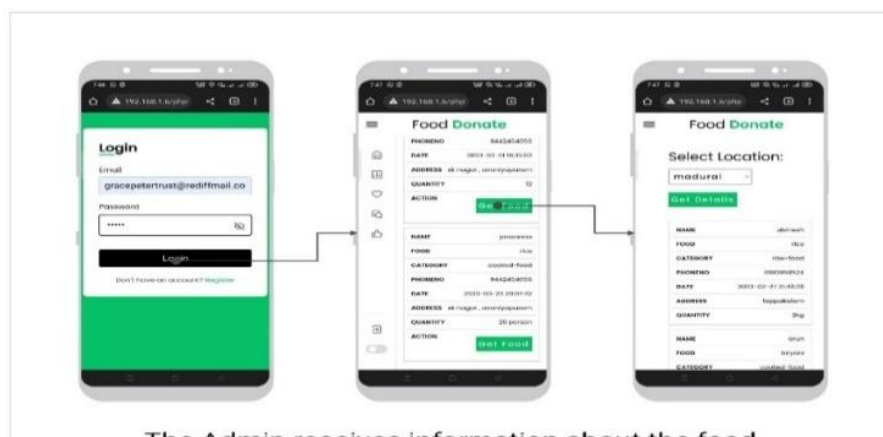

Fig 1. User Interface

Fig 2. Donation Process

- **Admin:** Admin have to first register and after that they can sign-in.

While registration application needs NAME, MAIL-ID, CITY, ADDRESS, PASSWARD. After sign-in the admin can see number of donations live on the dashboard in total or according to city.

The Admin receives information about the food donation from the User module and lists it for NGOs and charities to choose from.

Fig 3. Admin Interface

Fig 4. Activity Diagram

CONCLUSION

In conclusion, this application helps by solving the issue of food waste by designing an application for food donation management system with an easily understandable interface. This interface helps by reducing the gap by connecting or linking the Donors and the Ngo, Charities, those in need with the help of a local admin managing all donations live on the dashboard. This application simply decreases the food wastage which is edible in an efficient manner. Those with surplus food can share the food by donating it via helping in reduction in food wastage.

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