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Tracking of Food Waste for Productive Usage

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ABSTRACT :

Food waste is a persistent global issue, affecting both developing and developed nations, where large quantities of edible food are discarded due to inefficient resource distribution, logistical constraints, and lack of awareness. Simultaneously, millions suffer from hunger and malnutrition. This paper presents the design and implementation of a Food Waste Management System an online platform aimed at bridging the gap between food surplus and scarcity. The system is developed using PHP for the backend, MySQL as the database, and HTML, CSS, and JavaScript for the front-end interface. It employs a role-based architecture with three modules: User (donor), Admin, and Delivery Agent. User can register food details such as type, quantity, and pickup location; admin validate entries and assign tasks; and delivery agents transport food to NGOs or beneficiaries. Key features include a responsive design, chatbot assistance, secure authentication, and a real-time dashboard for administrators. The system not only enhances food redistribution but also contributes to Sustainable Development Goals by promoting responsible consumption and reducing hunger through digital intervention.

KEYWORDS : Food Waste, Donation System, Food Redistribution, Web Application, Role-Based Access, Delivery Management, Chatbot Support, Sustainable Development Goals (SDG), Hunger Reduction, Real-Time Dashboard

INTRODUCTION

Food wastage has emerged as a pressing global issue, characterized by the paradox of excessive food disposal on one hand and rampant hunger and malnutrition on the other. The United Nations Food and Agriculture Organization (FAO) estimates that approximately 1.3 billion tons of food are wasted globally each year, accounting for nearly one-third of all food produced for human consumption. This not only represents a tremendous economic loss but also exerts significant pressure on natural resources, contributing to greenhouse gas emissions, water scarcity, and land degradation. The problem is particularly acute in urban areas, where overproduction, inefficient supply chains, and lack of awareness among consumers and businesses exacerbate food wastage.

In response to this challenge, there is an increasing need for technological interventions that can streamline the collection and redistribution of surplus food. The Food Waste Management System proposed in this paper aims to bridge the gap between food donors and individuals in need through a digital platform that facilitates timely, efficient, and transparent food sharing. This web-based system enables donors such as restaurants, caterers, and households—to log surplus food, which can then be verified and dispatched by administrators to registered delivery agents for distribution. By leveraging the capabilities of PHP for server-side logic, MySQL for backend data storage, and HTML, CSS, and JavaScript for an intuitive front-end interface, the platform delivers a seamless user experience.

The system's architecture is built on a modular, role-based access model, categorizing stakeholders into three main roles: Users, Admin, and Delivery Agents. Each role is provided with specific functionalities tailored to their operational requirements. For example, donors can schedule pickups and monitor donation history, while administrators manage the workflow, approve donations, and oversee delivery logistics. Delivery agents, in turn, are assigned tasks via an interactive dashboard, enabling them to carry out pickups and deliveries efficiently.

This initiative not only addresses the logistical barriers in food redistribution but also aligns with broader societal goals, such as the United Nations Sustainable Development Goals (SDGs), particularly Goal 2: Zero Hunger, and Goal 12: Responsible Consumption and Production. By integrating digital technology with community welfare initiatives, the Food Waste Management System aspires to foster a culture of social responsibility, reduce food wastage, and promote equitable food access in a sustainable and scalable manner.

LITERATURE SURVEY

In recent years, various systems and technologies have been developed to reduce food waste and manage surplus food efficiently. These research contributions highlight different approaches, including web platforms, IoT systems, policy frameworks, deep learning, mobile apps, and gamified user engagement.

Ms. K. Sharmila Devi and Sundareshwar S. [1] proposed a web-based Food Waste Management System that enables collection and redistribution of leftover food from functions and hotels to the needy. Their system is based on three modules—Admin, Donor, and User—emphasizing role-based access and donation tracking. It supports the foundation of food donation systems with real-time monitoring.

Da Costa et al. [2] in their systematic review on IoT-based real-time monitoring discussed the deployment of temperature, humidity, and GPS sensors in food supply chains. These sensors track the condition of food throughout its lifecycle, helping reduce spoilage and loss. Their insights are relevant for integrating freshness tracking into delivery operations.

Ajayi, Baum, and Chu [3] analyzed food waste programs in San Francisco, Taiwan, and South Korea, presenting a model for reducing urban food waste. Their framework incorporates government policy, community engagement, and education, offering guidelines that could be adapted for large-scale rollouts of food waste tracking systems.

Espinoza Alejandro Z. [4] developed a deep learning-based classification system using Convolutional Neural Networks (CNNs) to automate identification of food waste types. The system achieved high accuracy and minimized manual input errors, which is a promising enhancement for image-based food donation entries.

Komal Pagere et al. [5] presented a mobile-based food donation platform involving NGOs, hotels, and agriculturists. The Android app allows scanning, expiration tracking, and redirection of non-consumable food for composting. Their field-level interface complements centralized web platforms and encourages last-mile donations.

Kilibarda et al. [6] focused on food waste in the hospitality sector, analyzing how operational inconsistencies lead to wastage. They advocate for integrated management systems and provide environmental impact data, reinforcing the need for dedicated hospitality-based modules in waste management systems. Al-Shammari and Fadhil [7] proposed FoodWise, a system that combines geolocation, gamification, and crowdsourcing to identify food waste hotspots. It collects regional food waste data and encourages user participation. Their innovative approach introduces the potential for engaging users in waste monitoring through incentives.

ANALYSIS OF PROBLEM

Food wastage remains a widespread and multifaceted issue that significantly impacts both developed and developing nations. Despite the availability of surplus food, a large portion of the global population continues to suffer from hunger and malnutrition. This paradox is largely attributed to inefficient resource allocation, poor supply chain management, and a lack of coordination between potential donors and recipients. Furthermore, conventional food redistribution systems often rely on manual processes, making them slow, inconsistent, and prone to data loss or human error. A major challenge lies in the absence of a centralized and automated platform to facilitate the systematic collection and redistribution of excess food. Donors such as restaurants, caterers, and individuals often have no direct means of connecting with those in need. Additionally, logistical issues including tracking food availability, verifying donations, assigning delivery tasks, and monitoring delivery status require a structured and real-time solution to ensure food reaches its destination before it spoils.

Security and usability present further concerns. Without proper user authentication and role-based access control, the system may be prone to unauthorized access or data manipulation. Moreover, platforms lacking intuitive interfaces may discourage user participation, thereby reducing the effectiveness of food recovery efforts. The Food Waste Management System is proposed to address these gaps by providing a role-based, web-enabled platform for food donors, administrators, and delivery personnel. It aims to automate the end-to-end process of food donation, validation, and distribution, while also offering real-time updates, secure login mechanisms, and user-friendly interfaces. This system not only mitigates food wastage but also contributes to broader sustainability and community welfare objectives.

SYSTEM DESIGN

The Food Waste Management System is a PHP-MySQL based web application designed to minimize food wastage by efficiently collecting surplus food and redistributing it to those in need. It is structured into three major modules User, Admin, and Delivery each handling a specific function within the system. The frontend is built using HTML, CSS, and JavaScript, with a responsive design that adapts to mobile screens. Users such as hotels, restaurants, and individuals can register and log in securely to donate food, specifying details such as food name, type (veg/non-veg), category (raw/cooked/packed), quantity, and pickup location. This information is stored in a MySQL database, and all submissions are routed to the admin for verification.



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The Admin module oversees system management. Admins can log in to view total users, food donations, and feedback, and they are responsible for approving food entries and assigning delivery agents. The Delivery module allows registered personnel to view available pickups, accept orders, and update status as "picked up" or "delivered." The system includes a chatbot support feature to assist users with FAQs and donation steps, and it uses secure login mechanisms with password hashing to protect user data. The design also includes role-based access control, ensuring that users, admins, and delivery agents access only the features relevant to them. Together, these components create a seamless workflow from donation to delivery, promoting transparency, reducing food waste, and supporting community welfare.

SYSTEM FLOWCHART



The Food Waste Management System operates through three main user roles: User, Administrator, and Delivery. The flowchart below illustrates the logical process each role follows to ensure food donation, management, and delivery are streamlined efficiently.

1. User Flow: Donating Food

The user initiates the donation process. Here's the step-by-step breakdown:

- i. Register/Login to the platform.
- ii. Food Donate: The user chooses to donate food.
- iii. Provide the food name and select food type (Veg/Non-veg).
- iv. Specify if the food is raw, cooked, or packed.
- v. Enter the quantity and location of donation.
- vi. Food Donated Successfully once all details are submitted.

2. Admin Flow: Managing Data

The administrator oversees system operations and user activities:

- i. Register/Login to the admin portal.
- ii. Access the Admin Dashboard.
- iii. View a list of total registered users.
- iv. Monitor and manage ratings and feedback.
- v. View food delivered by users.
- vi. Optionally, accept the food after verifying information.
- vii. If accepted, the food is marked as successfully received.

3. Delivery Flow: Logistics and Dispatch

The delivery personnel handle food collection and transportation:

- i. Register/Login to the delivery interface.
- ii. Access available orders listed by users.
- iii. Accept an order for pickup.
- iv. Pick up the order from the user's location.
- v. Deliver to specified location.
- vi. Mark as Order Delivered Successfully upon completion.

METHODOLOGY

The proposed project, Tracking of Waste Food Management, is a role-based web application designed to facilitate the donation, collection, and redistribution of surplus food from donors to recipients through an organized and traceable platform. The system follows a modular approach that includes User, Admin, and Delivery Agent roles, ensuring effective tracking, monitoring, and execution of food donation tasks.



1.1 System Architecture Overview

- The system architecture is based on a three-tier model:
 - Frontend Layer: User Interface developed using HTML, CSS, JavaScript
 - Backend Layer: Server-side logic using PHP
 - Database Layer: MySQL for persistent data storage of users, donations, and delivery information.
- 1.2 Functional Modules

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(a)User Module

- 1. User register and log into the system.
- 2. They can fill in donation forms including:
 - i. Food Name
 - ii. Meal type (veg or nonveg)
 - iii. Category (Raw, Cooked, Packed food)
 - iv. Quantity (number of person /kg)
 - v. Contact Details (Name, Phone Number, District, Address).

Food Donate	Contact Details
Food Name:	Name:
Jeal type -	Akansha
● Veg O Non-veg	PhoneNo:
Select the Category:	
tion neat	District: Madurai Address:
Quantity:(number of person /kg)	submit

Chatbot Support:

A friendly Chatbot Interface helps users by answering frequently asked questions like:

- \circ How does food donation work?
- \circ Who can donate food?
- How is food distributed?
- \circ Do you have another question?

This improves accessibility and user engagement while reducing load on manual support.

Please select a question: How does food donation work? Who can donate food? How is food distributed? Do you have another question?		CHAT	вот	
How does food donation work? Who can donate food? How is food distributed?	Pleas	e select a question:		
Who can donate food? How is food distributed?	How does fo	ood donation work?		
How is food distributed?	Who can do	nate food?		
Do you have another question?	How is food	distributed?		
bo you have another question:		Do you have anot	her question?	

(b)Admin Module

The Admin Module serves as the backend control panel for managing and monitoring user activity, donations, feedback, and system operations. Admins play a crucial role in ensuring smooth functioning and transparency of the food donation process. Key Features:

- 1. Admin Login:
 - A secure login system ensures that only authorized personnel can access the admin panel.
- 2. Dashboard Overview:

A real-time visual dashboard helps admins monitor the system quickly and efficiently.

- i. Total Users: Displays the number of registered users.
- ii. Feedbacks: Shows feedback count from users.
- iii. Total Donations: Tracks the cumulative number of donations received.
- iv. Recent Donations Table: Lists real-time information about recent donations including:
 - a. Donor name
 - b. Food details (name, category)
 - c. Contact number
 - d. Date and time of submission
 - e. Address
 - f. Quantity donated
 - g. A "Get Food" action button for delivery or pickup coordination.

3. Analytics:

Admins can visualize and analyze data to evaluate the effectiveness of the donation system, identify high-donation areas, and understand user behavior.

- 4. Manage Donations & Feedbacks:
 - i. View and respond to feedback
 - ii. Accept or reject donation entries
 - iii. Track donation history



(c) Delivery Module

The Delivery Module is designed for delivery agents responsible for collecting donated food and delivering it to recipients or distribution centers. This interface streamlines logistics and ensures traceability of every food donation.

Key Features:

Delivery Agent Login: 1.

Delivery agents log in with their registered credentials to access assigned orders and maps.

- 2. Home Dashboard:
 - Personalized greeting with email. i. ii.
 - Navigation buttons:
 - Home a.
 - b. Map - opens navigation assistance for route tracking.
 - My Orders lists all assigned or available orders. c.
 - Order Management Table: 1.
 - Displays available orders with key details: i.
 - Name: Donor's name a.
 - b. Phone No: Contact for pickup
 - Date/Time: Timestamp of donation c.
 - d. Pickup Address: Food source location
 - Delivery Address: Intended delivery point e.

Action: Button labeled "Take order" to assign the order to the delivery agent

Food Dona	te			Home map	myorders
		Welcome abco	d@gmail.com		
		My or	ders		
NAME	PHONENO	DATE/TIME	PICKUP ADDRESS	DELIVERY ADDRESS	ACTION
Akansha	9699778090	2025-04-12 11:53:56	Amravati	abcd	Take order

CONCLUSION

The Food Waste Management System offers a structured, technology-driven solution to reduce food wastage and support underprivileged communities. By enabling coordinated interactions between user, admin, and delivery agents, the platform ensures that surplus food is efficiently collected, verified, and delivered.

Key features such as secure login, responsive design, chatbot support, and real-time dashboards enhance usability and system management. Its scalable and modular architecture allows adaptation across regions and institutions, contributing directly to Sustainable Development Goals (SDGs) like Zero Hunger and Responsible Consumption.

Future enhancements may include mobile apps, GPS tracking, and AI-based analytics to optimize delivery and improve decision-making. With further development, the system has the potential to become a large-scale solution for responsible food redistribution.

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