Smart Food Waste Management System

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***Abstract*—Food waste is a significant global issue, particularly in hotels, restaurants, and large-scale events, where large quantities of edible food are often discarded. At the same time, many underprivileged people suffer from hunger due to the lack of an efficient food distribution system. The Smart Food Waste Management System is designed to address this problem by creating a digital platform that connects food donors with NGOs and charitable organizations.**

The system enables donors to update surplus food availability in real time, including details such as quantity, location, and expiry time. Registered NGOs receive instant notifications and can send pickup requests through the platform. An admin module is included to manage users, monitor activities, and approve requests, ensuring transparency and accountability in the process. Developed using Python, Flask, and MySQL, the system provides a lightweight, efficient, and user-friendly web-based solution. By improving communication and coordination between donors and receivers, the proposed system helps reduce food wastage and ensures timely distribution of surplus food to those in need.

***Index Terms*—Food waste management, Donation system, NGO, Tracking system, Flask, MySQL, Web application**

I. INTRODUCTION

Food wastage has become a critical problem in modern society. Large quantities of edible food are discarded daily, particularly in urban areas. Meanwhile, underprivileged communities struggle to access basic nutrition.

This project proposes a web-based system to minimize food waste and improve food redistribution efficiency. By connecting donors and NGOs through a centralized platform, the system ensures faster communication and effective utilization of surplus food.

1.1 Food Waste Management System Overview

The Smart Food Waste Management System is designed to act as a bridge between food donors and NGOs. It allows donors to share food details and NGOs to request and collect food efficiently.

1.2 Need for the System

- Increasing food wastage
- Lack of proper communication
- Delay in food distribution
- No tracking system

II. SYSTEM ARCHITECTURE

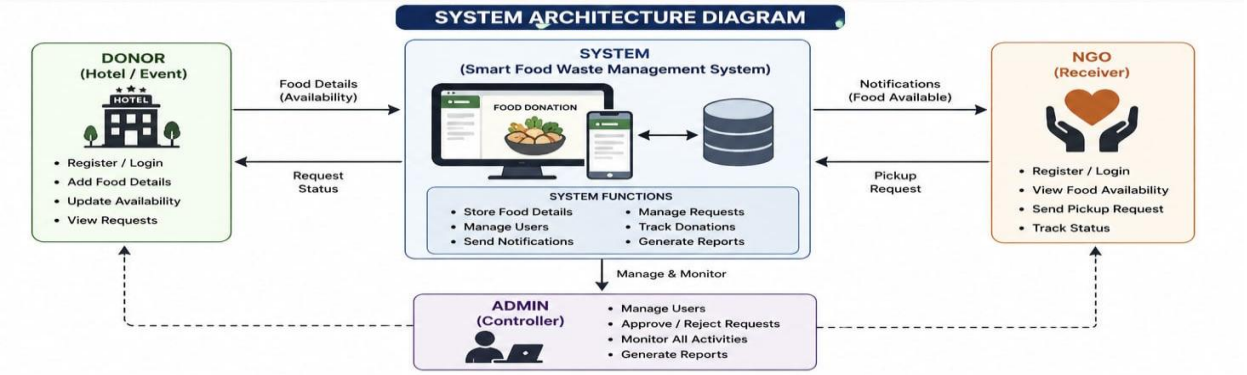

Fig 2.0 System Architecture Diagram

2.1 Flow Diagram of Smart Food Waste Management System

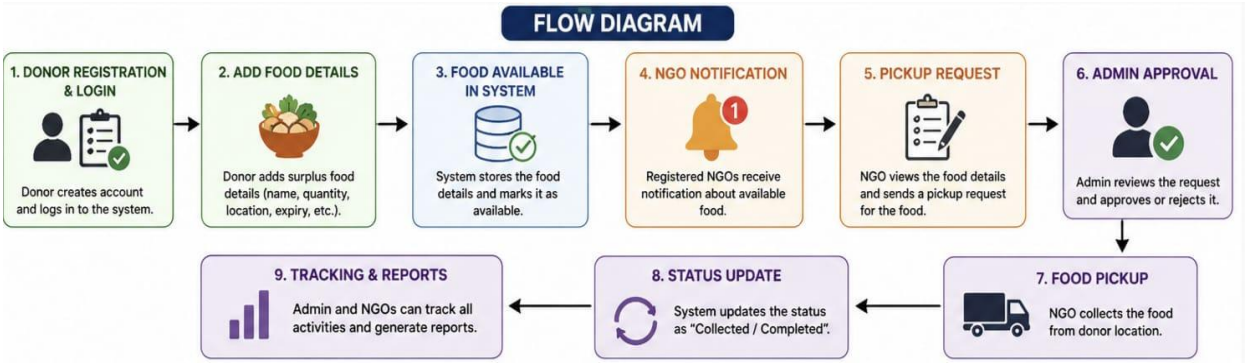

Fig 2.1 Flow Diagram

III. MODULES

The Smart Food Waste Management System is divided into three major modules: Donor Module, NGO Module, and Admin Module. The Donor Module allows hotels, restaurants, and event organizers to register into the system and upload details of surplus food such as quantity, type, location, and expiry time. This module ensures that food availability is updated in real time.

The NGO Module is designed for charitable organizations that require food for distribution. NGOs can register, view available food details, and send pickup requests based on their requirements. They can also track the status of their requests within the system.

The Admin Module plays a crucial role in managing the overall system. The admin is responsible for verifying users, monitoring food updates, approving or rejecting pickup requests, and ensuring that the entire process runs smoothly and transparently.

IV. METHODOLOGY

The methodology of the proposed system involves several stages, starting from data collection to system deployment. Initially, the system collects data from donors regarding surplus food availability. This data includes details such as food type, quantity, location, and expiry time.

Next, the system is designed using a web-based architecture with Flask as the backend framework and MySQL as the database. The collected data is stored and processed efficiently within the database. After the design phase, different modules such as donor, NGO, and admin are implemented and integrated.

The system is then tested to ensure proper functionality, including food updates, notifications, request handling, and tracking features. Finally, the system is deployed as a web application, allowing users to access it easily and perform their respective tasks.

V. WORKING OF SYSTEM

The working of the Smart Food Waste Management System follows a simple and efficient process. Initially, the donor logs into the system and updates the details of surplus food available. These details are stored in the database and made visible to all registered NGOs.

Once the food information is uploaded, the system automatically notifies NGOs about the availability. NGOs can then view the details and send a pickup request through the system. The admin reviews the request and either approves or rejects it based on availability and validity.

After approval, the NGO proceeds to collect the food from the donor location. The system updates the status of the request, allowing both donor and NGO to track the process. This ensures smooth coordination and reduces food wastage effectively.

VI. DATABASE DESIGN

The database design of the system is structured to manage user information, food details, and request tracking efficiently. The system uses a relational database (MySQL) with multiple tables interconnected through relationships.

The Users table stores information about all users, including donors, NGOs, and admin, with fields such

as user ID, name, email, role, and password. The Food table contains details of surplus food uploaded by donors, including food ID, donor ID, food name, quantity, location, and expiry time.
The Request table is used to manage pickup requests made by NGOs. It includes fields such as request ID, NGO ID, food ID, and status. These tables are linked using primary and foreign keys to ensure data consistency and integrity. This structured design helps in efficient data storage, retrieval, and management.

VII. EXISTING SYSTEM

In the current scenario, food donation and redistribution processes are mostly carried out through informal and manual methods. Hotels, restaurants, and event organizers often rely on personal contacts or phone calls to donate surplus food. There is no centralized platform to connect food donors with NGOs or charitable organizations efficiently.
Due to the lack of a proper system, communication delays frequently occur between donors and receivers. As a result, food is often wasted before it can be distributed to those in need. Additionally, there is no mechanism to track food availability, pickup status, or delivery confirmation, leading to poor transparency and accountability.
The absence of real-time updates and automated notifications further reduces the efficiency of the existing system. NGOs may not always be aware of available food, and donors may not find suitable recipients in time.

Disadvantages of Existing System

- Manual communication (calls, messages)
- No real-time updates
- Lack of centralized platform
- No tracking system
- High chances of food wastage
- Time-consuming process
- Lack of transparency

VIII. PROPOSED SYSTEM

The proposed Smart Food Waste Management System is a web-based platform designed to efficiently reduce food wastage by connecting food donors such as hotels, restaurants, and event organizers with NGOs and charitable organizations. The system provides a centralized and automated solution to manage food donation and distribution.
In this system, donors can register and upload details of surplus food, including quantity, type, location, and expiry time. Once the food details are updated, the system automatically notifies registered NGOs in real time. NGOs can view the available food and send pickup requests through the platform.
An admin module is included to monitor system activities, manage users, and approve or reject requests. The system also provides tracking features to ensure transparency in the food donation process, from availability to pickup and delivery.
The proposed system is developed using Python (Flask framework) for backend processing and MySQL for database management, ensuring a lightweight, scalable, and user-friendly solution.

Advantages of Proposed System

- Centralized platform for donors and NGOs
- Real-time food availability updates
- Instant notification system
- Easy pickup request management
- Tracking and transparency
- Reduces food wastage
- Time-efficient and reliable

IX. APPLICATIONS

The Smart Food Waste Management System can be widely applied in various sectors to reduce food wastage and support social welfare. It is highly useful in hotels and restaurants where excess food is generated regularly. Event management companies can also use this system during weddings, parties, and large gatherings to donate leftover food. NGOs and charitable organizations can utilize the system to access food easily and distribute it to needy people. Additionally, the system can be implemented by government bodies and social service organizations to improve food distribution efficiency and reduce hunger.

X. FUTURE ENHANCEMENTS

The system can be further improved by integrating advanced technologies and additional features. A mobile application can be developed to make the system more accessible and user-friendly. GPS

tracking can be added to track the exact location of food pickup and delivery in real time.

Artificial Intelligence can be used to predict food demand and optimize distribution. SMS and email notification systems can be integrated to improve communication between users. Additionally, features like rating systems, feedback mechanisms, and automated alerts can be included to enhance user experience and system efficiency.

XI. CONCLUSION

The Smart Food Waste Management System provides an effective and practical solution to reduce food wastage and address hunger issues in society. By creating a centralized digital platform, the system successfully connects food donors such as hotels and event organizers with NGOs and charitable organizations.

Through real-time updates, instant notifications, and a structured pickup request process, the system improves coordination and ensures timely distribution of surplus food. The inclusion of tracking and admin monitoring enhances transparency and reliability.

Developed using Python, Flask, and MySQL, the system is efficient, user-friendly, and scalable. Overall, this project contributes to social welfare by minimizing food waste and ensuring that excess food reaches those in need in a timely manner.

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