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Smart Food Donation Platform for Hunger Reduction

Under the Guidance of Mr. Kamlesh Chopra Assistant Professor Indore Institute of Science and Technology	Aashi Rathod Indore Institute of Science and Technology	Aishwarya Patil Indore Institute of Science and Technology	Kanak Jaiswal Indore Institute of Science and Technology

***Abstract*—** Food wastage and hunger are two major problems faced by society today. Large amounts of food are wasted daily in restaurants, hotels, weddings, and households, while many people suffer from hunger and lack of proper nutrition. Technology can play an important role in connecting food donors with needy people and reducing food wastage. This paper presents a smart food donation platform designed to improve food redistribution and hunger reduction through a digital system. The platform helps restaurants, individuals, NGOs, and volunteers donate excess food efficiently using an online platform. The proposed platform provides transparency, faster communication, secure data management, and better coordination between donors and receivers. The system includes donor registration, food request modules, real-time food availability updates, and location-based distribution support. The platform aims to reduce food waste, support social welfare, and improve food accessibility for underprivileged people.

Keywords: Food Donation, Hunger Reduction, Food Waste Management, Smart Platform, Web Application, Social Welfare

INTRODUCTION

Food is one of the basic human necessities, yet millions of people around the world suffer from hunger and malnutrition every day. At the same time, a large quantity of food is wasted from restaurants, hotels, cafeterias, social events, and households. According to reports from global food organizations, food wastage has become a serious social and environmental issue.

The imbalance between food wastage and hunger highlights the need for efficient food redistribution systems. In many cases, leftover food that is still safe and consumable is discarded because there is no proper communication channel between food donors and needy people. Traditional food donation methods mainly depend on manual coordination, phone calls, local contacts, and physical communication, which are often inefficient and time-consuming.

Technology can play a major role in solving this issue by creating smart digital platforms that connect food donors, NGOs, volunteers, and receivers through online systems. A web-based food donation platform can help improve communication, reduce delays, increase transparency, and ensure that excess food reaches people who need it before it gets wasted.

The Smart Food Donation Platform is designed to provide an efficient solution for hunger reduction and food waste management using modern web technologies. The platform enables restaurants, hotels, event organizers, and individuals to donate excess food through an online interface. NGOs, shelters, and volunteers can access available food information and coordinate food collection and distribution activities more effectively.

The proposed platform includes features such as donor registration, food availability updates, request management, user authentication, database management, and real-time communication. The system aims to improve transparency, coordination, and accessibility in food donation activities.

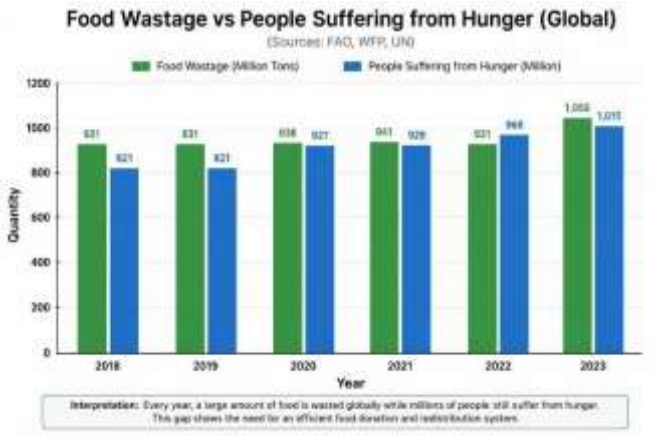
In addition to reducing food wastage, the platform also supports social welfare and sustainable development goals related to hunger reduction and responsible resource utilization. By using digital technology for food redistribution, the proposed system contributes toward building a more efficient, organized, and socially responsible donation network.

The main objective of this research paper is to study the development and implementation of a Smart Food Donation Platform that can improve food distribution efficiency, reduce food wastage, and support hunger reduction activities through modern web technologies.

Traditional food donation methods are generally unorganized and inefficient. Many donors are unable to connect with needy people or organizations at the correct time. Due to the lack of communication and proper transportation support, large amounts of usable food are wasted daily.

Technology-based food donation platforms can help solve this issue by creating a digital connection between food donors and receivers. The proposed Smart Food Donation Platform provides an online environment where donors can register excess food information, and NGOs, or needy people, can request available food resources.

The main objective of this research paper is to develop a smart and efficient platform for reducing hunger and minimizing food wastage using modern web technologies.



FOOD WASTAGE VS PEOPLE SUFFERING FROM HUNGER

EXISTING SYSTEM

The traditional food donation process mainly depends on manual communication methods such as phone calls, local contacts, social media messages, and physical coordination. In many cases, food donors do not know where to donate excess food, while needy people and NGOs are unable to access available food resources at the correct time.

Due to the absence of a proper digital platform, a large quantity of edible food is wasted daily. In the existing system, restaurants, hotels, wedding halls, and households often dispose of leftover food because there is no efficient mechanism for connecting them with food receivers. The process of identifying nearby NGOs or volunteers is time-consuming and unorganized.

Many food donation activities depend on personal networks and local communication, which limits the reach and effectiveness of food distribution.

The traditional system also lacks real-time food availability updates. Receivers are unable to know whether food is available nearby, and donors cannot track whether their donated food reaches needy people successfully. This creates communication gaps and delays in food redistribution.

Another major issue in the existing system is transportation and coordination management.

Since there is no centralized digital monitoring system, volunteers and NGOs face difficulties in collecting and distributing food efficiently. In many situations, food gets spoiled before reaching the receivers due to delays in coordination.

- The existing system faces several limitations:
- Lack of communication between donors and receivers.
- No real-time food availability tracking.
- Large amounts of food wastage.
- Difficulty in transportation and coordination.
- Lack of transparency in food distribution.
- Limited reach of food donation activities.

Due to these problems, the traditional system is inefficient for large-scale food redistribution.

PROPOSED SYSTEM

The proposed Smart Food Donation Platform is a web-based platform designed to connect food donors with NGOs, volunteers, and needy people through a digital interface. The system helps manage food donation requests efficiently and reduces food wastage.

The proposed platform contains the following modules:

Donor Module

The donor module allows restaurants, hotels, event organizers, and individuals to register and upload details of available food. Donors can provide information such as:

- Food quantity
- Food type
- Pickup location
- Expiry time
- Contact details

Receiver Module

The receiver module allows NGOs, shelters, volunteers, and needy people to search and request available food donations.

Admin Module

The admin manages user verification, food request monitoring, and platform security.

Volunteer Module

Volunteers help transport food from donors to receivers and support coordination activities.

The proposed system improves communication, reduces delays, and ensures better food distribution.

Feature	Traditional Method	Smart Platform
Communication	Manual	Digital
Food Tracking	Difficult	Real-Time
Transparency	Low	High
Efficiency	Moderate	High
Coordination	Time Consuming	Faster

TRADITIONAL METHOD VS SMART PLATFROM

SYSTEM ARCHITECTURE

The Smart Food Donation Platform follows a client-server architecture where users interact with the web application through an internet connection.
The architecture contains the following components:

- Frontend Interface
- Backend Server

- Database Management System
- Authentication System
- Food Donation Request Module
- Notification System

The frontend is developed using HTML, CSS, and JavaScript to provide a user-friendly interface. The backend handles user authentication, food donation requests, and data processing. MySQL is used as a database management system for storing user and donation information.
The system architecture supports secure communication and efficient data management between different users.

TECHNOLOGIES USED

The following technologies are used in the development of the Smart Food Donation Platform to provide an efficient, user-friendly, and secure environment for food donation and redistribution activities.

Technology	Purpose
HTML	Webpage Structure
CSS	Styling and Design
JavaScript	Frontend Interactivity
Java	Backend Development
MySQL	Database Management
Apache Tomcat	Server Deployment

TECHNOLOGY STACK

These technologies help create a responsive and user-friendly web platform. These technologies work together to create a secure, responsive, and efficient web-based food donation platform that improves communication between donors, receivers, NGOs, and volunteers.
Used for creating the basic structure of webpages such as registration forms, login pages, food donation forms, navigation bars, and user interfaces.
Used for webpage styling, responsive layouts, animations, color combinations, fonts, and improving the overall visual appearance of the platform. Used for frontend interactivity, form validation, popup notifications, dynamic content updates, button actions, and improving user experience. Used as the backend programming language for handling server-side operations, authentication, request processing, business logic, and system functionality. Used for establishing connectivity between the Java application and MySQL database for efficient data storage and retrieval operations.

HTML (Hypertext Markup Language) is used to create the structure and layout of the Smart Food Donation Platform. It helps design forms, tables, navigation menus, login pages, dashboards, and donation interfaces. HTML provides the foundation for displaying content on the platform.

CSS (Cascading Style Sheets) is used for improving the visual appearance and responsiveness of the web application. It controls colors, fonts, spacing, alignment, animations, and responsive page layouts. CSS helps make the platform attractive and user-friendly.

JavaScript is used for implementing front-end interactivity and dynamic webpage behavior. Features such as form validation, alert messages, popup notifications, real-time updates, and button interactions are implemented using JavaScript.

Java is used as the backend programming language for developing the core functionality of the application. It handles user authentication, food donation processing, request handling, session management, and communication with the database. Java provides platform independence, security, and reliability. JDBC (Java Database Connectivity) is used to connect the Java backend with the MySQL database. It enables efficient storage, retrieval, update, and management of application data.

MySQL is used as a database management system for storing and organizing application data. It stores user information, donation details, food requests, login credentials, and transaction records securely and efficiently.

Apache Tomcat is used as the server environment for deploying and running the Java web application. It processes client requests and supports Java Servlets and JSP technologies for backend operations.

Servlets are used for processing user requests and generating responses dynamically. They act as the communication layer between frontend webpages and backend business logic.
JSP is used for creating dynamic webpages that integrate frontend designs with backend functionalities. JSP improves user interaction and supports dynamic content generation.

Bootstrap is used to create responsive and mobile-friendly web interfaces. It provides prebuilt design components and improves webpage responsiveness across different devices.

Development tools such as VS Code and NetBeans are used for coding, debugging, testing, and managing the application efficiently.

Git and GitHub help manage source code versions, project backups, and collaborative development processes.

WORKING OF THE SYSTEM

The Smart Food Donation Platform works through a digital process that connects food donors, NGOs, volunteers, and needy people using a web-based application. The system is designed to reduce food wastage and improve the efficiency of food redistribution through proper coordination and communication.

Step 1: User Registration and Login

The first step of the system is user registration and authentication. Different users such as donors, receivers, volunteers, and administrators can register on the platform using their personal details. After successful registration,

users can securely log into the system using their username and password. The authentication system helps maintain security and prevents unauthorized access to the platform.

Step 2: Food Donation Upload

After logging into the platform, donors such as restaurants, hotels, event organizers, and individuals can upload details about available food items. The donor provides information such as:

- Food type
- Quantity of food
- Pickup location
- Expiry time

The uploaded information is stored in the database and becomes visible to receivers and NGOs through the platform.

Step 3: Food Request Process

Receivers, NGOs, shelters, and volunteers can search for available food donations using the platform. If suitable food is available nearby, they can send a request to the donor through the system. The platform helps users identify available food resources quickly and improves communication between donors and receivers.

Step4: Verification and Coordination

Once the request is approved, volunteers or NGOs coordinate the food pickup and delivery process. The admin monitors all donation activities to ensure proper food distribution and prevent misuse of the platform. The coordination process helps reduce delays and improves transparency in food redistribution.

Step 5: Food Distribution

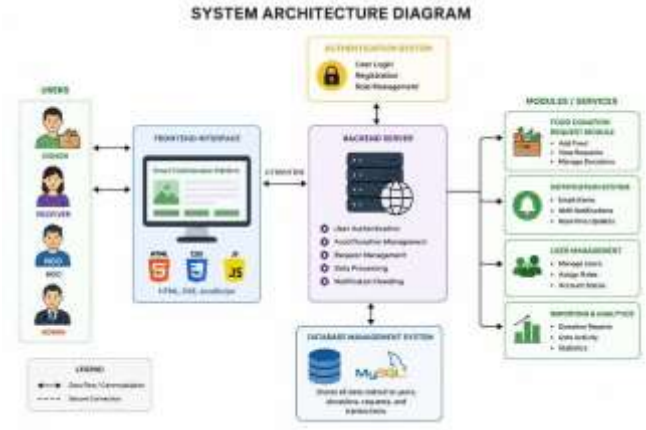
After successful coordination, the food is delivered to needy people, shelters, or NGOs. The platform helps ensure that excess food reaches people before it gets wasted. This process supports social welfare and reduces hunger in local communities.

Step 6: Database Management and Monitoring

All user activities, food donation records, requests, and delivery information are stored in the MySQL database. The admin can monitor system activities, manage users, and maintain platform security. The database management system helps improve record keeping, transparency, and efficient data retrieval.

The working process of the Smart Food Donation Platform is as follows:

- The donor registers and logs into the platform.
- The donor uploads details about available food.
- The information is stored in the database.
- NGOs or receivers search for available food donations.
- Receivers send food requests through the platform.
- Volunteers coordinate pickup and delivery.
- Admin monitors all activities and maintains system security.
- This process ensures efficient food distribution and minimizes food wastage.



SYSTEM ARCHITECTURE DAIGRAM
+
ADVANTAGES OF THE PROPOSED SYSTEM

The Smart Food Donation Platform provides several advantages:

- Reduces food wastage.
- Helps needy people access food resources.
- Improves communication between donors and receivers.
- Provides real-time food availability information.
- Supports transparency in food distribution.
- Reduces hunger and promotes social welfare.
- Saves transportation and coordination time.
- Encourage community participation.

These features make the proposed system more efficient than traditional donation methods.

APPLICATIONS OF THE PLATFORM

The Smart Food Donation Platform can be used in multiple areas such as:

- Restaurants and hotels
- Wedding events and parties
- NGOs and social welfare organizations
- College campuses and cafeterias
- Community food drives
- Disaster relief and emergency support
- QR-code based food verification
- Automated food quality monitoring
- Multilingual support
- Online payment and donation support
- Emergency food distribution during disasters
- AI chatbots for user support
- Smart inventory management systems

The platform can help improve food accessibility and support social development.

APPLICATION FLOW

CHALLENGES AND LIMITATIONS

Although the proposed platform provides several benefits, certain challenges still exist:

- Internet connectivity issues in rural areas.
- Transportation and logistics management.
- Food quality and hygiene verification.
- User authentication and misuse prevention.
- Limited awareness among donors and receivers.

These limitations can be improved through better infrastructure and awareness programs.

Although the Smart Food Donation Platform provides several advantages for reducing hunger and minimizing food wastage, certain challenges and limitations still exist in the implementation and operation of the system.

One major challenge is internet connectivity and digital accessibility.

In rural and underdeveloped areas, many users may not have proper internet access or smartphones to use the platform efficiently. This can limit the reach of the system in remote locations. Transportation and logistics management are another important challenge.

Even if food donations are available, delays in transportation and coordination may affect timely delivery. In some situations, food may spoil before reaching the receivers due to improper handling or lack of nearby volunteers.

Food quality and hygiene maintenance also remain critical concerns. The platform cannot fully guarantee the freshness and safety of donated food. Proper verification and inspection mechanisms are required to ensure food quality before distribution.

Another limitation is user authentication and misuse prevention. Fake registrations, false donation claims, and unauthorized activities may affect the reliability of the system. Strong authentication and monitoring mechanisms are necessary to maintain platform security and transparency.

Scalability and server performance may also become challenges when the number of users and donation requests increases rapidly. Large-scale data management requires better infrastructure, optimized databases, and cloud-based technologies for efficient performance.

The platform also depends heavily on volunteer participation and NGO coordination. Lack of active volunteers may reduce delivery efficiency and affect food distribution processes.

FUTURE SCOPE

The Smart Food Donation Platform has significant future potential for improving food redistribution and hunger reduction activities through advanced digital technologies. As technology continues to evolve, the platform can be expanded with additional smart features to improve efficiency, transparency, accessibility, and large-scale food distribution management. One major future improvement is the development of a mobile application for Android and iOS devices. A mobile application can provide faster communication between donors, receivers, volunteers, and NGOs through instant notifications and real-time updates. Mobile accessibility can help users donate or request food more conveniently from any location.

Artificial Intelligence (AI) and Machine Learning algorithms can also be integrated into the platform to predict food demand, analyze donation patterns, and reduce food wastage more effectively. AI-based analytics can help identify high-demand areas and optimize food distribution processes. PS and location tracking technologies can improve transportation and delivery coordination. The platform can automatically identify nearby donors, NGOs, and volunteers to reduce delivery time and transportation costs. Real-time route optimization can improve the efficiency of food distribution.

Cloud computing technologies can be integrated to improve scalability, storage, and system performance. Cloud-based systems can support large-scale user management and improve data accessibility across different locations. Blockchain technology can also be introduced in the future to improve transparency and secure tracking of food donations. Blockchain-based records can help maintain secure and tamper-proof donation history, improving trust among users and organizations.

The platform can further be integrated with government welfare programs, social organizations, restaurants, supermarkets, and educational institutions to expand food donation networks. Real-time reporting and analytics dashboards can help monitor food distribution activities and improve resource management.

Future versions of the system may also include:

- QR-code based food verification
- Automated food quality monitoring
- Multilingual support
- Online payment and donation support
- Emergency food distribution during disasters
- AI chatbots for user support
- Smart inventory management systems

The future development of the Smart Food Donation Platform can contribute significantly toward building a more sustainable, transparent, and socially responsible food distribution ecosystem.

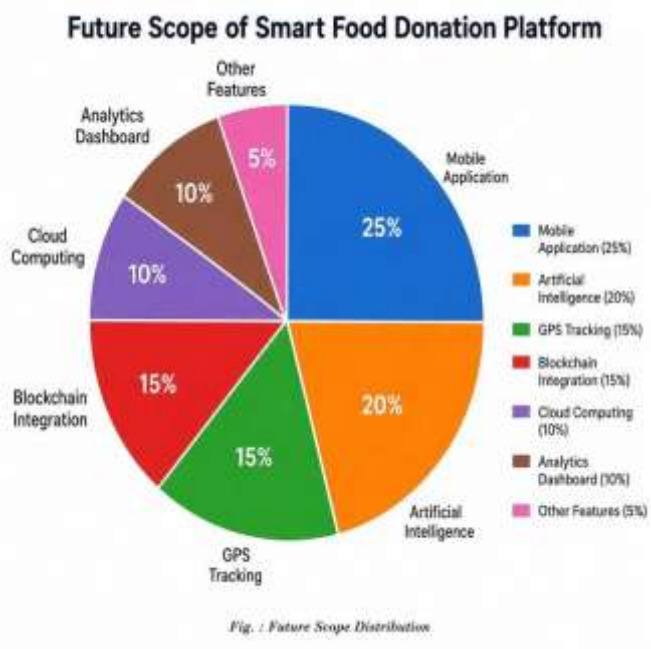


Fig. : Future Scope Distribution

GRAPH OF FUTURE SCOPE

CONCLUSION

The Smart Food Donation Platform provides a smart and efficient solution for reducing food wastage and helping people suffering from hunger. The proposed platform creates a digital connection between food donors, NGOs, volunteers, and needy people through a web-based application. By using modern technologies, the system improves communication, transparency, and coordination in food distribution activities. The platform allows donors to upload food details in real time, while receivers can search and request available food resources easily. The system also helps reduce delays, improve food accessibility, and minimize unnecessary food disposal.

Features such as secure user authentication, database management, and online request handling make the platform reliable and user-friendly.

The proposed system demonstrates how technology can support social welfare and sustainable development. With future improvements such as mobile applications, GPS tracking, and AI-based analytics, the Smart Food Donation Platform can become a more advanced and large-scale solution for hunger reduction and efficient food redistribution.

The system supports transparency, faster coordination, and secure data management while helping underprivileged people access food resources. The use of modern web technologies improves platform efficiency and usability.

The proposed platform demonstrates how technology can contribute to social welfare and sustainable development. With future improvements and large-scale adoption, smart food donation platforms can play an important role in reducing hunger and improving food accessibility worldwide.

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