IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 7, April 2025
Impact Factor: 7.67

SmartEats: A Smart Platform for Food Conservation and Donation

Sarthak Kalla, Tushar Gupta, Chirag Sharma
Dronacharya College of Engineering, Gurugram, India

Abstract: *SmartEats is a transformative web platform designed to address the global issue of food wastage by seamlessly connecting donors such as restaurants, supermarkets, and individuals with NGOs and charitable organizations. This paper provides a comprehensive overview of the SmartEats project—its objectives, significance, technological foundation, development methodology, and potential societal impact. By utilizing the MERN stack alongside real-time technologies, machine learning, and secure authentication, SmartEats presents an innovative, scalable, and socially impactful solution aimed at bridging the gap between surplus and scarcity*

Keywords: SmartEats

I. INTRODUCTION

Food waste is a critical challenge, especially in a world where hunger and malnutrition continue to affect millions. While restaurants and households dispose of tons of edible food daily, many go hungry. SmartEats aims to resolve this imbalance by offering a digital platform that enables surplus food to reach those in need. The platform empowers donors to list excess food, while verified NGOs can browse and claim donations, creating an efficient and traceable distribution channel.

SmartEats goes beyond just food listings. It incorporates real-time tracking, expiry alerts, AI-based demand forecasting, and insightful dashboards to promote transparency, efficiency, and engagement. By combining cutting-edge technology with a humanitarian mission, the platform contributes to sustainable development goals while promoting community welfare.

Background and Significance

According to the Food and Agriculture Organization (FAO), nearly one-third of the food produced globally is wasted. Simultaneously, hunger remains a persistent issue. SmartEats addresses this paradox by streamlining food redistribution using modern technology. Its significance lies in its ability to:

- Promote sustainability by minimizing food waste.
- Build a bridge between excess and need.
- Empower local communities and NGOs with access to real-time surplus inventories.
- Enhance donation logistics using automation and analytics.

The platform reflects a growing need for tech-driven social solutions and aligns with the global movement toward resource optimization and zero hunger.

II. LITERATURE SURVEY

Several non-profits and tech initiatives have attempted to tackle food wastage:

Feeding America and Feeding India focus on redistribution but often lack end-to-end automation and advanced analytics.

OLIO connects neighbors and local businesses for food sharing but operates more like a marketplace.

Unlike existing systems, SmartEats offers a fully integrated platform combining:

- AI for demand forecasting.
- Geolocation tracking via WebSockets.

DOI: 10.48175/IJARSCT-25474

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 7, April 2025
Impact Factor: 7.67

- Secure token-based user authentication.
- Dashboards for impact visualization.

This approach provides a more comprehensive, scalable, and automated food redistribution model.

III. METHODOLOGY/PLANNING OF WORK

The development of SmartEats follows a structured 7-phase methodology:

Requirement Analysis

- Identify user roles: donors, NGOs, and admins.
- Define platform features and technical specs.

System Design

- UI wireframes created using Figma.
- Design of MongoDB schema for listings, users, and donations.

Development

- Frontend built using **React**, **Material-UI**, and **Bootstrap**.
- Backend APIs developed using **Node.js** and **Express**.
- JWT implemented for secure user sessions.

Integration

- Integration of **TensorFlow** for demand prediction.
- Real-time features powered by **WebSockets**.

Testing

- Unit testing with **Jest**.
- API testing with **Postman**.
- UAT for usability and stress testing.

Deployment

- Hosted on **AWS** or **Heroku**.
- MongoDB Atlas used as the cloud-managed database.

Maintenance & Future Enhancements

- Continuous monitoring using feedback.
- Planned enhancements: multilingual support, ML-driven matchmaking, and AR-based listing visuals.

Technologies Used

Frontend Technologies:

- **ReactJS**: Dynamic and modular UI building
- **Bootstrap & Material-UI:** Responsive layouts and design elements
- **React Router DOM:** Navigation and routing

Backend Technologies:

- **Node.js & Express.js:** API creation, authentication, request handling
- **JWT:** Secure user authentication
- **WebSockets:** For real-time data and geolocation tracking

Database & Hosting:

- **MongoDB & MongoDB Atlas:** Flexible NoSQL storage
- **AWS / Heroku:** Cloud-based scalable hosting

Machine Learning & Analytics:

- **TensorFlow:** AI for predicting donation demand and expiry trends
- **Power BI:** Dashboards for visualizing donation trends and impacts

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 7, April 2025
Impact Factor: 7.67

Version Control:

- **Git** and **GitHub**: Collaborative development, version tracking

Features and Benefits

Key Features:

- **Donor Listings:** Donors can list surplus food with quantity, type, and expiry.
- **NGO Matchmaking:** NGOs browse and claim donations**.**
- **Live Updates:** Real-time tracking and pickup coordination.
- **Expiry Alerts:** Notifications for food nearing expiration.
- **AI-Powered Insights:** Donation trend analysis and demand forecasting.
- **Data Dashboards:** Visual stats on donations and impact.

Benefits:

- **Social Welfare:** Reduces hunger by streamlining food redistribution.
- **Sustainability:** Reduces waste and carbon footprint.
- **Scalability:** Adapts to city, state, or national operations.
- **Efficiency:** Automated workflows reduce manual effort and overhead.

Facilities Required for Proposed Work

The development and deployment of SmartEats require several facilities, including:

- **Development Environment**: Personal computers with at least 8GB RAM, preferably 16GB, equipped with Visual Studio Code and Git for version control.
- **Hosting**: Cloud platforms such as **Heroku**, **AWS**, or **Google Cloud** with scalable infrastructure to support growing data and user traffic.
- **Testing Equipment**:
- Multiple devices (PC, tablet, smartphone) for responsive testing.
- Tools like **Postman** and **Jest** for backend and frontend testing.

Software Stack:

- React, Node.js, MongoDB, TensorFlow, Power BI
- Libraries: Bootstrap, Material-UI, React Router, JWT, Express.js
- Deployment: MongoDB Atlas, GitHub, Git

Network Infrastructure:

- Reliable high-speed internet and CDN like **CloudFront** for low-latency data delivery.

Testing and Evaluation

To ensure optimal performance and usability, the platform undergoes:

- **Unit Testing**: Component-level validation for React components and backend APIs.
- **Integration Testing**: Verifies the end-to-end interaction between frontend, backend, and database.
- **Real-Time Simulation**: Tests for live updates and user notification functionalities.
- **Performance Testing**: Measures system behavior under heavy donation traffic.
- **User Acceptance Testing (UAT)**: Ensures user needs and expectations are met.

DOI: 10.48175/IJARSCT-25474

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 7, April 2025
Impact Factor: 7.67

IV. RESULTS AND DISCUSSION

Initial implementation and trials of SmartEats demonstrate effective donor-NGO communication, reduction in expired inventory, and successful food pickups. Dashboards reveal donation frequency trends and impacted regions, allowing informed decisions. The platform proves to be a promising solution to minimize waste and promote food equity through digital technology.

V. CONCLUSION

SmartEats provides an innovative and practical solution to a significant global problem—food wastage. By integrating AI, real-time updates, and user-friendly interfaces, the platform successfully connects surplus to scarcity, reducing hunger and promoting sustainability. Its comprehensive feature set, scalable architecture, and data-driven insights position it as a futuristic tool for social welfare.

Future Work

- Planned future developments include:
- Integration of AR for visualizing food listings.
- Addition of volunteer coordination features.
- Use of blockchain for donation traceability.
- Multilingual support for wider accessibility.

Recommendations

- Collaborate with government bodies and NGOs to expand reach.
- Implement awareness programs to promote adoption among restaurants and food providers.
- Monitor environmental KPIs to measure ecological impact of reduced food waste.

VI. LIMITATIONS

- Dependent on consistent internet access for real-time updates.
- Challenges in maintaining consistent donor-NGO engagement.
- Limited reach in rural or low-tech areas.

Implications

SmartEats has the potential to impact multiple domains—social welfare, environmental conservation, and food security. By enabling community-driven solutions backed by AI and technology, the platform contributes meaningfully to achieving the UN Sustainable Development Goals.

REFERENCES

[1]. FAO Reports on Global Food Wastage
[2]. React, Node.js, MongoDB Official Documentation
[3]. TensorFlow Developer Guide
[4]. Power BI Tutorials and Case Studies
[5]. Academic Papers on Food Distribution and Resource Management