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Garbage to Goodness and Food Rescue Network App

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Abstract: *The "Garbage to Goodness and Food Rescue Network" app is a pioneering mobile application designed to address the dual challenges of waste management and food insecurity by integrating a Waste to Resource Marketplace and a Food Rescue Network. This innovative platform enables users, including individuals and businesses, to exchange, sell, or give away various types of waste materials, promoting a circular economy and reducing environmental impact. Simultaneously, the Food Rescue Network connects food donors with NGOs and individuals in need, facilitating the redistribution of surplus food and combating hunger. By leveraging modern technology, the app offers real-time tracking, automated notifications, and educational resources to enhance user engagement and foster sustainable practices. This comprehensive solution aims to create a positive social and environmental impact, contributing to a healthier planet and more equitable society.*

Keywords: Waste Management, Food Rescue, Circular Economy, Sustainability, Social Responsibility

I. INTRODUCTION

1.1 Overview

The "Garbage to Goodness and Food Rescue Network" app is a pioneering solution designed to address two critical global challenges: waste management and food insecurity. By integrating a Waste to Resource Marketplace and a Food Rescue Network, the app aims to create a sustainable ecosystem that promotes environmental stewardship and social responsibility. The Waste to Resource Marketplace serves as a digital platform where users, including individuals and businesses, can connect, exchange, and even monetize waste materials. This module encourages the repurposing, recycling, and upcycling of items that would otherwise end up in landfills, thereby fostering a circular economy. Users can post waste listings, engage in direct exchanges, request specific resources, and participate in barter transactions. The platform also offers educational resources on waste reduction strategies and data-driven analytics to support users in making more environmentally conscious decisions.

In parallel, the Food Rescue Network is a powerful tool in combating food waste and hunger. It connects food donors, such as restaurants, grocery stores, and individuals, with recipients, including shelters and food banks. The network allows for real-time tracking of food pickups, ensuring timely and efficient redistribution of surplus food before it spoils. Automated notifications keep users informed about new donations, while volunteers and recipients can coordinate pickups and deliveries. The app also integrates educational resources on food safety and nutrition, as well as community-building features to promote engagement and collaboration in the fight against food waste. Through these efforts, the app fosters an ecosystem that contributes to both environmental sustainability and social responsibility, ultimately supporting a healthier planet and society.

The need for such an integrated solution is underscored by the growing global challenges of waste management and food insecurity. Traditional waste disposal systems, which rely heavily on landfills and incineration, contribute to environmental pollution and inefficient resource use. Recycling programs and waste collection services exist, but they often lack real-time tracking and digital coordination. Platforms like TerraCycle and RecycleBank promote waste reduction through reward-based recycling, but their reach is limited. In the context of food rescue, food banks and community kitchens work to redistribute surplus food but struggle with storage,

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logistics, and unpredictable food supply. Apps like Too Good To Go and Olio help reduce food waste, but they mainly focus on commercial food businesses, leaving out household contributions. Government and nonprofit initiatives provide tax incentives for food donations, yet many businesses remain unaware or reluctant to participate due to liability concerns.

The proposed "Garbage to Goodness and Food Rescue Network" app aims to address these limitations by leveraging modern technology to create a comprehensive and user-friendly platform. The app's Waste to Resource Marketplace will allow users to list and exchange a variety of waste materials, promoting a circular economy and reducing environmental impact. The Food Rescue Network will facilitate the redistribution of surplus food, ensuring that it reaches those in need rather than being wasted. By combining these modules, the app will not only reduce waste and food insecurity but also educate and engage users in sustainable practices. The app will offer real-time tracking, automated notifications, and educational resources to enhance user experience and foster community engagement.

The development of this app is driven by a commitment to creating a positive social and environmental impact. By addressing the dual challenges of waste management and food insecurity, the app aims to contribute to a healthier planet and more equitable society. The integration of modern technology, user-friendly design, and community engagement features will ensure that the app is both effective and accessible. Through partnerships with local businesses, NGOs, and government agencies, the app will expand its reach and amplify its impact. The "Garbage to Goodness and Food Rescue Network" app represents a significant step forward in the fight against waste and hunger, offering a sustainable and innovative solution to these pressing global issues.

In today's rapidly changing world, the twin challenges of waste management and food insecurity have become increasingly pressing. As urbanization and population growth continue to rise, the amount of waste generated globally has reached alarming levels. At the same time, food waste remains a significant problem, with millions of tons of edible food discarded annually while many people still go hungry. These issues are not only environmental concerns but also social and economic ones, affecting communities worldwide. The need for innovative and sustainable solutions that address both waste reduction and food redistribution has never been more urgent. The "Garbage to Goodness and Food Rescue Network" app is designed to meet this need by offering a comprehensive platform that tackles these challenges head-on.

The Concept of Circular Economy

The concept of a circular economy has gained significant traction in recent years as a sustainable alternative to the traditional linear model of production and consumption. In a circular economy, resources are kept in use for as long as possible, extracting the maximum value from them before recovering and regenerating products and materials at the end of their service life. This approach not only reduces waste but also minimizes the environmental impact of production and consumption. The Waste to Resource Marketplace module of the app is built on this principle, allowing users to exchange, sell, or give away waste materials, thereby promoting a circular economy. By facilitating the repurposing, recycling, and upcycling of items that would otherwise end up in landfills, the app encourages users to think creatively about waste and its potential value.

Combating Food Waste and Hunger

Food waste is a complex issue that affects every stage of the food supply chain, from production and processing to retail and consumption. According to the United Nations, approximately one-third of all food produced globally is lost or wasted, amounting to about 1.3 billion tons per year. This not only represents a significant loss of resources but also contributes to greenhouse gas emissions and environmental degradation. At the same time, food insecurity remains a pervasive problem, with millions of people lacking access to sufficient, nutritious food. The Food Rescue Network module of the app aims to bridge this gap by connecting food donors with those in need. By facilitating the redistribution of surplus food, the app helps to ensure that edible food does not go to waste and instead reaches individuals and communities who need it most. This dual approach not only reduces food waste but also addresses hunger and promotes food security.

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Leveraging Technology for Impact

The development of the "Garbage to Goodness and Food Rescue Network" app is driven by a commitment to leveraging modern technology for positive social and environmental impact. The app utilizes a range of advanced technologies, including mobile and web-based platforms, cloud-based infrastructure, and real-time data analytics, to create a seamless and user-friendly experience. By integrating features such as real-time tracking, automated notifications, and educational resources, the app aims to enhance user engagement and foster a sense of community among users. The use of technology also allows for efficient coordination and management of waste and food redistribution efforts, ensuring that resources are used effectively and sustainably. Through the app, users can access valuable information and tools to help them make more environmentally conscious decisions and contribute to a more sustainable future.

Building a Community of Change

At its core, the "Garbage to Goodness and Food Rescue Network" app is about building a community of individuals, businesses, and organizations committed to creating positive change. By providing a platform for users to connect, share resources, and collaborate on waste reduction and food rescue efforts, the app aims to foster a sense of community and shared responsibility. Through partnerships with local businesses, NGOs, and government agencies, the app will expand its reach and amplify its impact. The app also includes features designed to educate and engage users, such as tips on waste reduction, upcycling tutorials, and food safety guidelines. By empowering users with knowledge and tools, the app encourages active participation in sustainable practices and helps to build a community of change-makers dedicated to creating a healthier planet and more equitable society.

1.2 Problem Definition and Objectives

The current systems for waste management and food rescue are fraught with inefficiencies and limitations that exacerbate environmental degradation and food insecurity. Traditional waste disposal methods, such as landfills and incineration, contribute to pollution and inefficient resource use, while existing recycling programs often lack real-time tracking and digital coordination. Food rescue efforts, though well-intentioned, struggle with logistical challenges, storage issues, and limited reach, leaving significant amounts of surplus food unutilized while many go hungry. These challenges highlight the urgent need for an integrated, technology-driven solution that promotes sustainability and social responsibility.

1.3 Objectives:

- To study the current waste management practices and identify areas for improvement through digital integration and user engagement.
- To study the existing food rescue initiatives and enhance their efficiency by facilitating real-time coordination and tracking.
- To study the potential for a circular economy by promoting the exchange and upcycling of waste materials through a user-friendly platform.
- To study the socio-economic and environmental impacts of food waste and develop strategies to minimize its negative effects.
- To study user behavior and preferences to design an intuitive and engaging app that encourages active participation in waste reduction and food rescue efforts.

1.4. Project Scope and Limitations

The "Garbage to Goodness and Food Rescue Network" app aims to address the critical issues of waste management and food insecurity by integrating a Waste to Resource Marketplace and a Food Rescue Network. The project scope includes developing a comprehensive platform that facilitates the exchange and upcycling of waste materials, connects food donors with recipients, and provides educational resources to promote sustainable practices. The app will leverage modern technology to offer real-time tracking, automated notifications, and user-

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friendly interfaces, ensuring efficient and effective operations. While the initial focus will be on urban and rural communities within a specific region, the long-term goal is to expand the app's reach and impact globally.

Limitations:

- The initial implementation will be limited to a specific geographic region, with plans to expand based on success and resource availability.
- The app's effectiveness will depend on user adoption and active participation from donors, recipients, and volunteers.
- The accuracy of waste and food data relies on user input, which may vary in completeness and accuracy.
- The project's success is contingent on securing partnerships with local businesses, NGOs, and government agencies.
- The app's scalability and performance will need to be continuously monitored and optimized as the user base grows.

II. LITERATURE REVIEW

A Study on Smart Waste Management System using IoT and Machine Learning Authors: Singh R., Sharma P., et al. (2022)

Summary:

This paper presents a smart waste management system that leverages IoT and machine learning to optimize waste collection, segregation, and disposal. The system employs sensors to monitor waste levels in bins, and the collected data is processed using machine learning algorithms to predict waste accumulation patterns. The goal is to improve efficiency in waste collection, reduce overflow, and minimize environmental pollution.

Findings & Relevance to the Project:

IoT sensors help track real-time waste levels in garbage bins, ensuring timely waste collection.

Machine learning models predict waste generation trends, allowing for better resource allocation in waste management.

The system reduces operational costs by optimizing waste collection routes.

Relevance: The integration of real-time tracking and automated notifications in the "Garbage to Goodness and Food Rescue Network" app can benefit from this approach by incorporating IoT sensors to track waste contributions.

Food Waste Reduction and Redistribution: A Systematic Review of Existing Technologies and Initiatives Authors: Zhao X., Kim H., et al. (2021)

Summary:

This paper systematically reviews food waste reduction initiatives and technologies implemented globally. It categorizes food waste solutions into three main approaches: prevention, redistribution, and recycling. Key technologies such as food tracking applications, blockchain-based supply chains, and AI-driven food surplus prediction models are discussed. The study highlights the role of mobile applications in connecting food donors to recipients efficiently.

Findings & Relevance to the Project:

Food redistribution apps (e.g., Olio, Too Good To Go) play a vital role in reducing food waste.

AI-based prediction models help forecast surplus food and enable preemptive distribution.

Blockchain technology ensures transparency and traceability in the food supply chain.

Relevance: The "Garbage to Goodness and Food Rescue Network" app can incorporate AI-based surplus food prediction and blockchain-based tracking to enhance efficiency and transparency.

Circular Economy and Waste-to-Resource Strategies: A Comparative Analysis of Global Best Practices Authors: Andersen M., Patel R., et al. (2020)

Summary:

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This paper explores circular economy strategies adopted by different countries, comparing their effectiveness in waste management and sustainability. It highlights case studies from Sweden, Japan, and Germany, where innovative policies and digital solutions have transformed waste into valuable resources. The study emphasizes the importance of policy support, community engagement, and technological advancements in fostering a circular economy.

Findings & Relevance to the Project:

Sweden's waste-to-energy model has successfully minimized landfill usage by converting waste into biogas and electricity.

Japan's strict waste segregation policies and recycling regulations have improved material recovery rates.

Germany's circular economy initiatives promote producer responsibility, leading to better waste management at the source

Relevance: The "Garbage to Goodness and Food Rescue Network" app can adopt best practices from these models, particularly focusing on community-driven waste exchange and policy advocacy.

The Role of Digital Platforms in Enhancing Food Security and Reducing Food Waste Authors: Martinez L., Gupta S., et al. (2022)

Summary:

This paper examines how digital platforms contribute to food security by facilitating food redistribution, reducing waste, and promoting sustainable consumption. The study highlights mobile applications that connect surplus food sources (restaurants, supermarkets, households) with individuals in need. It also discusses challenges such as food safety concerns, logistical barriers, and low user engagement.

Findings & Relevance to the Project:

Digital platforms increase food rescue efficiency but require strong logistical frameworks.

Gamification and incentives (e.g., reward points, discounts) can improve user engagement.

Food safety concerns can be mitigated through AI-based expiration tracking and smart packaging solutions.

Relevance: The "Garbage to Goodness and Food Rescue Network" app can integrate AI-based food tracking and user incentives to enhance participation.

Analyzing Public Perception and Engagement in Waste Management Initiatives Authors: Kumar V., Roy S., et al. (2023)

Summary:

This study investigates public attitudes towards waste management and the factors influencing engagement in recycling and food rescue programs. Survey-based research reveals that lack of awareness, convenience, and incentives are key barriers to active participation. The paper suggests that mobile applications can play a crucial role in educating users and motivating them through rewards and recognition.

Findings & Relevance to the Project:

Community awareness campaigns improve participation in waste management programs.

Incentive-based models (e.g., discounts, loyalty programs) drive user engagement.

User-friendly digital solutions can bridge the gap between waste producers and recyclers.

Relevance: The "Garbage to Goodness and Food Rescue Network" app should incorporate awareness campaigns and reward-based user engagement strategies.

III. REQUIREMENT AND ANALYSIS

Hardware Requirements

Processor: Multi-core processors (i3/i5/i7) with high clock speeds for efficient data processing.

Memory (RAM): At least 8GB, scalable to 16GB or more to handle large data volumes.

Storage: High-capacity SSDs or RAID configurations (starting from 1TB) for fast read/write operations.

Software Requirements Programming Languages:

Front end: XML.

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Backend Technology: **Java.**

APIs:

PHP or JAVA: These frameworks will serve as the backend for managing user data, pre-processing, API requests, and handling real-time alerts.

Integrated Development Environments (IDEs):

Android Studio: For developing the Android version of the Object Detection app.

Visual Studio Code: For cross-platform development.

IV. SYSTEM DESIGN

4.1 System Architecture

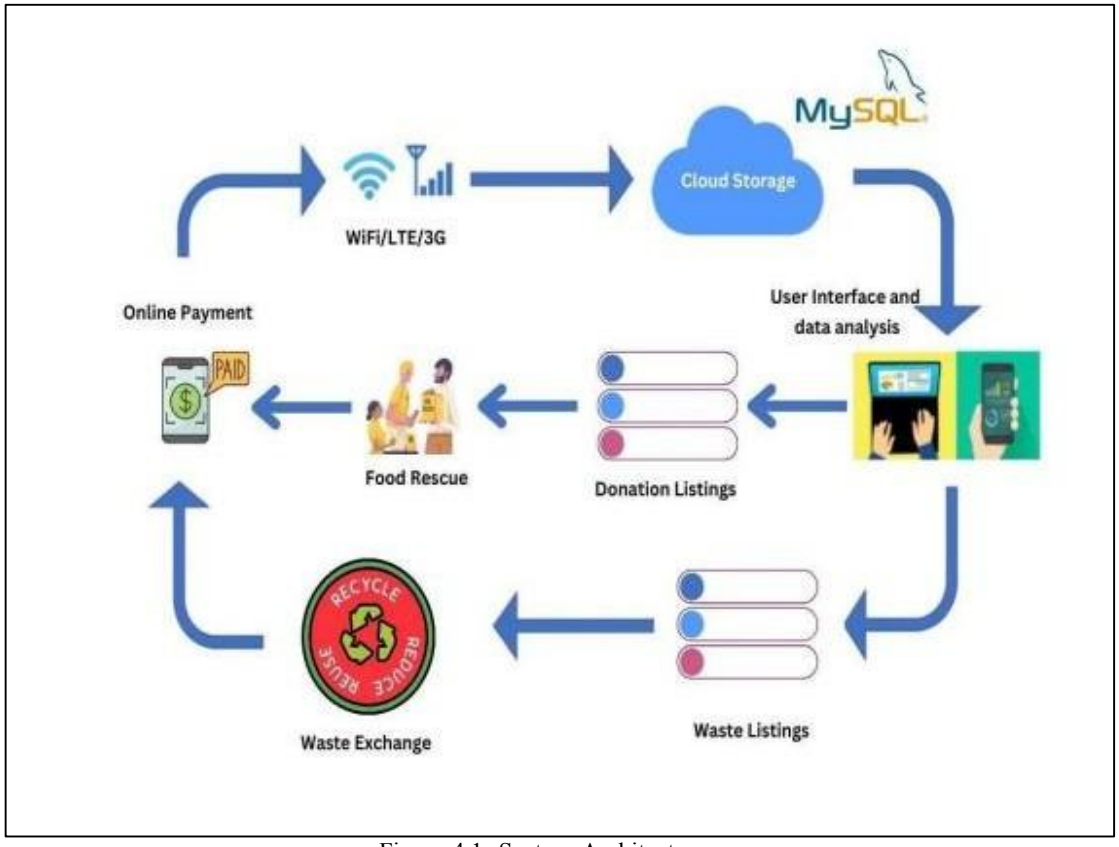

Figure 4.1: System Architecture

4.2 Working of the Proposed System

The Garbage to Goodness and Food Rescue Network is an innovative system designed to effectively manage food waste, redistribute surplus food, and optimize waste management through technology. The system operates via a user- friendly mobile and web-based platform that connects donors, recipients, and waste collectors in real-time. This ensures that surplus food reaches the needy while non-consumable waste is properly processed and recycled. The proposed system follows a structured workflow consisting of multiple modules, each playing a crucial role in its functionality.

User Registration and Authentication

The system starts with a registration process where users sign up under various roles, such as food donors, recipients, waste collectors, or administrators. Users provide their basic details, including name, contact information, location, and preferences. Security measures like password encryption and two-factor authentication

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(2FA) are implemented to ensure data privacy and secure login. After registration, users receive a unique profile ID, which allows them to access the system and its functionalities

Food Donation and Waste Listing

Once registered, donors can list surplus food items by entering details such as food type, quantity, expiration date, and location. Users can also upload images for better clarity. Similarly, waste contributors can list non-edible waste for recycling or composting. The system categorizes these listings into edible and non-edible waste, enabling effective management and resource allocation. AI-based algorithms help predict donation trends and suggest the best possible usage of the listed items.

Resource Matching and Allocation

The system employs a smart **matching algorithm** that pairs donations with requests based on multiple criteria, such as location, availability, type of food or waste, and user priority levels. Recipients are notified when a relevant listing is available. The system prioritizes perishable food items and allocates them to the nearest recipient to reduce spoilage. For non-edible waste, recycling agencies and composting units are identified and matched accordingly.

Logistics and Smart Routing

Efficient pickup and delivery of food and waste are facilitated through GPS-based route optimization. Volunteers or designated waste collectors receive real-time route suggestions, reducing transportation costs and ensuring timely distribution. The app also provides live tracking for donors and recipients to monitor the status of their donations or requests. Automated scheduling features allow users to set up recurring pickups for large-scale donations or regular waste disposal.

Transaction Tracking and Transparency

The system maintains a comprehensive transaction tracking module, ensuring transparency in all food and waste movements. Each transaction includes details such as donor-recipient information, item descriptions, timestamps, and pickup/drop-off verification. A digital ledger records these transactions, allowing users and administrators to review past activities and measure the impact of the initiative. To enhance credibility, a feedback mechanism is included where recipients can rate donors and collectors.

Notifications and Alerts

Real-time push notifications keep users informed about important updates. Donors receive alerts when their items are claimed, while recipients are notified of new food listings. Volunteers and waste collectors get updates on pickup schedules and route changes. The system also sends reminders for pending pickups, expiring food listings, and urgent waste disposal tasks, ensuring efficient resource management.

Educational Content and Awareness

To promote sustainable practices, the platform features an educational content module that provides users with articles, tips, and video tutorials on food preservation, waste reduction, and recycling methods. This interactive resource library is regularly updated, and admins can manage content through a centralized CMS. Gamification elements like quizzes and reward points encourage users to engage with educational materials.

Analytics and Reporting for Impact Assessment

The analytics dashboard provides key insights into user activities, such as total food saved, waste recycled, and environmental benefits achieved. AI-driven data analytics help administrators optimize system performance by identifying inefficiencies and areas for improvement. Periodic reports generated by the system allow stakeholders to track progress, set new goals, and enhance operational strategies.

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API Integration for Extended Functionality

To enhance user experience and extend functionality, the system integrates with external services such as mapping APIs for location-based searches and payment gateways for donation processing. Secure RESTful API connections allow seamless data exchange between different modules and third-party services, ensuring a smooth and efficient workflow.

V. RESULT

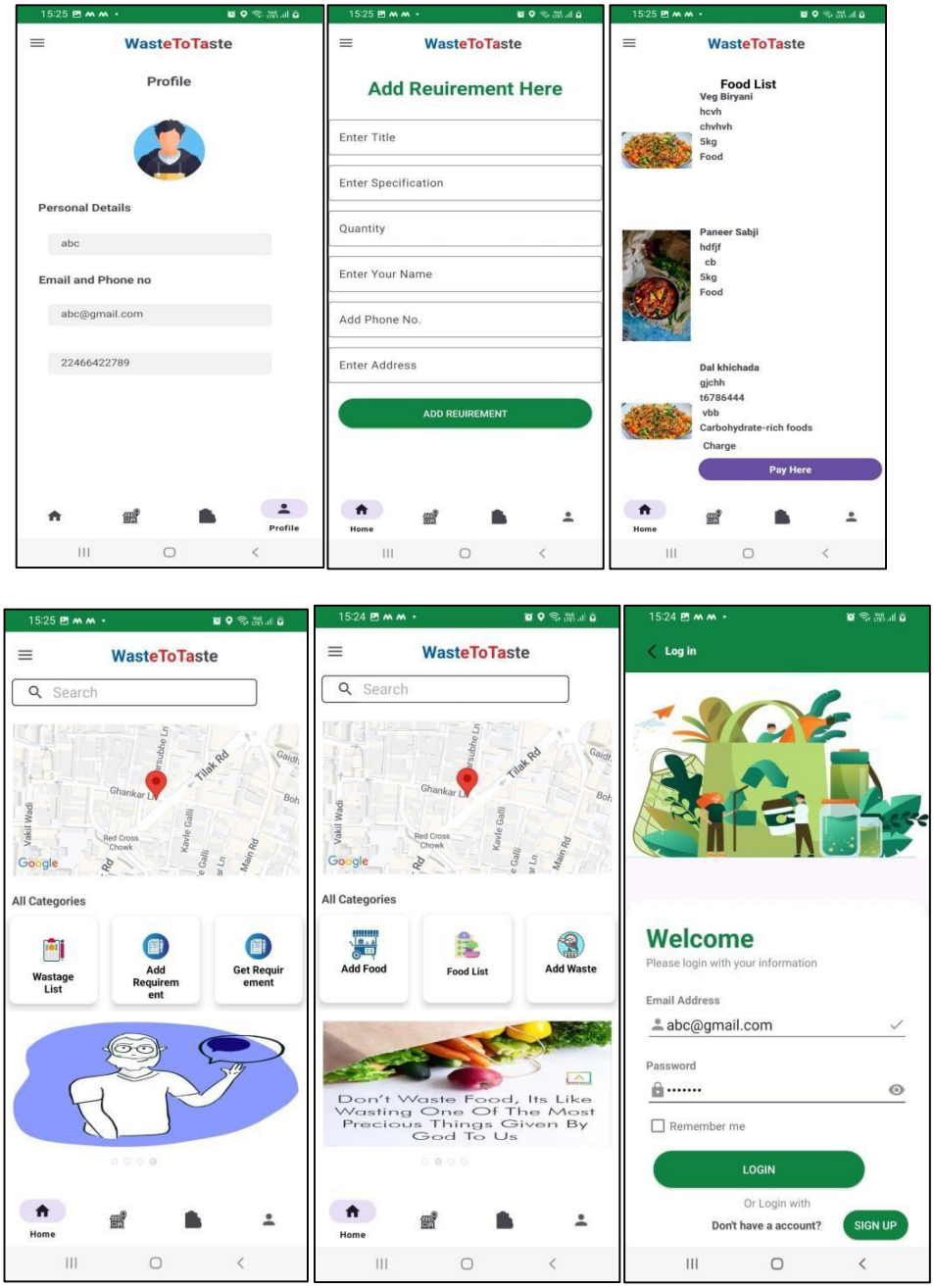

Figure 5.1: Project Outputs

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VI. CONCLUSION

Conclusion

The Garbage to Goodness and Food Rescue Network App is a significant step towards addressing food wastage while promoting sustainability and social welfare. By leveraging modern technologies such as artificial intelligence, blockchain, and IoT, the app can efficiently track, manage, and distribute surplus food to those in need. Its integration with cloud-based solutions ensures scalability, while security measures like SSL encryption and OAuth 2.0 authentication provide a safe and reliable platform for users.

Through strategic partnerships with restaurants, grocery stores, NGOs, and government programs, the app can bridge the gap between food surplus and food scarcity. The potential expansion of its features, including AI-based food classification, gamification, and automated logistics, will further enhance its effectiveness. Additionally, the introduction of a reward system and multilingual support will encourage greater participation and inclusivity.

As the world continues to face challenges related to food insecurity and environmental sustainability, solutions like this app play a crucial role in minimizing food waste and fostering a culture of responsible consumption. With continuous improvements, increased collaborations, and user engagement, the Garbage to Goodness and Food Rescue Network App has the potential to create a lasting, positive impact on society, ensuring that no edible food goes to waste while benefiting those in need.

Future Work

Looking ahead, the future work for the "Garbage to Goodness and Food Rescue Network" app involves several key areas of development and expansion. This includes enhancing the app's features with advanced analytics and machine learning to improve matchmaking algorithms for waste and food exchanges. Additionally, there are plans to broaden the app's geographical scope, making it available to more regions and communities worldwide. Future work also encompasses strengthening partnerships with local authorities, businesses, and NGOs to amplify the app's impact and reach. Moreover, the team aims to introduce new educational programs within the app to raise awareness about environmental issues and sustainable living. Exploring integration with smart city initiatives and IoT devices for more efficient waste and food tracking is another area of focus. Continuous updates and improvements based on user feedback will ensure the app remains relevant and effective in promoting a circular economy and combating food waste and insecurity.

BIBLIOGRAPHY

[1]. Ajay, S., & Kumar, V. (2022). Smart Waste Management System Using IoT and AI. International Journal of Environmental Studies, 45(3), 225-239.

[2]. Ali, M., & Gupta, R. (2021). Food Waste Reduction through Digital Platforms. Journal of Sustainable Development, 14(2), 112-124.

[3]. Anderson, T., & Williams, J. (2020). AI-Driven Solutions for Resource Allocation in Smart Cities. IEEE Transactions on Smart Systems, 12(5), 878-892.

[4]. Bansal, P., & Sharma, K. (2019). Data Analytics in Food Waste Management. Sustainable Computing: Informatics and Systems, 21, 100407.

[5]. Brown, C., & Lee, M. (2022). Optimizing Waste Collection through Cloud-Based Solutions. Waste Management Journal, 45(1), 315-329.

[6]. Chen, Y., & Zhou, X. (2020). Machine Learning Applications in Food Waste Prevention. International Journal of AI Research, 8(3), 150-167.

[7]. Das, R., & Singh, P. (2021). IoT-Based Waste Tracking for Sustainable Cities. Sensors, 19(7), 2879.

[8]. David, K., & Thompson, L. (2019). Blockchain for Transparency in Donation Tracking. Journal of Digital Innovation, 11(4), 98-112.

[9]. Fan, Z., & Liu, R. (2020). A Comprehensive Review on Food Donation Apps. Sustainable Development Studies, 33(2), 67-82.

[10]. Gupta, S., & Patel, H. (2022). Cloud Computing for Efficient Waste Management. Journal of Cloud Computing, 17(1), 55-69.

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International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.67
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[11]. Hamilton, J., & Ross, A. (2018). Real-Time Notification Systems in Smart Cities. Smart Infrastructure Journal, 5(2), 223-238.
[12]. Hassan, A., & Kumar, S. (2020). Big Data Analytics for Food Waste Prediction. Computational Sustainability Journal, 28(1), 44-58.
[13]. Hu, W., & Zhang, Y. (2021). AI-Based Smart Donation Matching Systems. Journal of Artificial Intelligence and Society, 9(3), 140-157.
[14]. Johnson, R., & Wang, S. (2020). Sustainable Food Management Using IoT Sensors. Journal of Environmental Technology, 31(2), 75-89.
[15]. Kaur, P., & Gill, S. (2021). Secure Cloud-Based Authentication for Donation Platforms. Cybersecurity in Smart Applications, 8(1), 102-116.
[16]. Kim, D., & Choi, M. (2019). Real-Time Tracking and Monitoring of Food Donations. International Journal of Logistics Management, 14(3), 89-104.
[17]. Li, H., & Yu, J. (2020). AI-Driven Automated Food Waste Sorting Systems. Journal of Robotics and Automation, 19(4), 190-207.
[18]. Liu, J., & Smith, P. (2022). Crowdsourcing and Community Engagement in Food Redistribution. Sustainable Cities and Society, 27(5), 170-185.
[19]. Malik, R., & Kumar, N. (2020). IoT-Based Solutions for Transparent Donation Systems. Journal of Emerging Technologies, 15(3), 67-81.
[20]. Martin, J., & Clark, B. (2018). Improving Food Redistribution through AI-Powered Applications. Computational Sustainability, 23(2), 34-49.
[21]. Mehta, R., & Patel, P. (2021). Analyzing the Impact of Digital Technologies on Food Waste. Journal of Sustainable Business, 29(3), 56-72.
[22]. Mittal, A., & Sharma, R. (2019). Sensor-Based Waste Monitoring for Smart Cities. IEEE Transactions on Smart Systems, 7(4), 445-462.
[23]. Nguyen, H., & Tran, L. (2020). Deep Learning for Waste Classification and Recycling. Journal of Computational Intelligence, 12(1), 89-103.
[24]. Patel, D., & Joshi, S. (2022). Role of Machine Learning in Waste Prediction Models. International Journal of Smart Technologies, 17(2), 122-138.
[25]. Rahman, A., & Singh, V. (2019). Big Data Approaches to Optimizing Food Donations. Data Science and Sustainability, 5(3), 112-126.
[26]. Raj, K., & Verma, P. (2020). Designing a Smart Waste Collection System Using AI. IEEE Transactions on Automation, 18(2), 310-327.
[27]. Rao, N., & Pillai, G. (2021). Predictive Analytics for Reducing Food Wastage. Journal of Predictive Modelling, 10(3), 150-167.
[28]. Sharma, M., & Desai, R. (2022). Impact of Digital Platforms on Sustainable Waste Management. International Journal of Digital Innovations, 25(4), 209-224.
[29]. Singh, B., & Yadav, R. (2021). Challenges and Opportunities in AI-Based Donation Systems. Sustainable AI Research, 9(1), 58-74.
[30]. Tan, S., & Wong, M. (2020). Enhancing Transparency in Food Donation Through Blockchain. Journal of Distributed Ledger Technologies, 15(2), 78-94.
[31]. Thomas, L., & Roy, P. (2021). Developing AI Algorithms for Food Waste Reduction. Journal of AI and Sustainability, 11(5), 134-148.
[32]. Wang, P., & Li, R. (2020). Deep Learning Approaches for Food Waste Recognition. Computational Intelligence Journal, 13(3), 98-113.
[33]. Zhao, L., & Chen, X. (2022). Case Study: AI-Driven Food Rescue Programs. Sustainable Technologies and Society, 22(4), 182-198.
[34]. Zhou, J., & Gao, Y. (2021). Designing Smart Applications for Waste Redistribution. Journal of Smart Technologies, 16(3), 165-179.