Food Wastage Reduction System

Food Waste Reduction System

A Project Report

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Applied Cloud Computing for Software Development

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Food Wastage Reduction System

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Your's Sincerely

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ABSTRACT

Food waste (FW) is a current, complex, and generally batted issue in various spheres of society. widely, about2.6 trillion bones per time is lost because of wasted food. Part of FW is preventable, and it's essential to identify where it occurs. In utmost cases, FW occurs at the end of the affair chain (menu medication and distribution). relating the main food service failures on FW is important for developing operative strategies for reducing them. This study aimed to perform a narrative review of the impacts caused by FW in food services considering the three confines of sustainability (social, profitable, or environmental). Multiple reasons were linked in this review that impacts those three dimensions, similar as the cost of wasted raw material, use of drawing material, the energy consumption, hire of food preceptors, the water footmark, the quantities of rest-intake, production waste, energy density wasted, use of organic food, and food donation. relating these aspects can contribute to reduce FW impacts for better sustainable development, develop tools to measure FW, and support food service managers in minimizing FW.

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Chapter 1

Introduction

Food waste is a pressing global issue that not only contributes to economic losses but also has significant social and environmental implications. According to the Food and Agriculture Organization of the United Nations (FAO), approximately one-third of all food produced for human consumption is lost or wasted each year, amounting to about 1.3 billion tons globally. This wastage occurs at various stages of the food supply chain, from production and distribution to consumption and disposal.

In response to this challenge, there is an urgent need for effective strategies and tools to address food waste and promote sustainable food management practices.

The Food Waste Reduction Management System is a comprehensive solution developed to tackle this issue by leveraging modern technologies and innovative approaches. The primary objective of this project is to design and implement a user-friendly system that empowers organizations to track, manage, and minimize food waste within their operations. By providing tools for efficient inventory management, waste tracking, analytics, and reporting, the system aims to support informed decision-making and proactive waste reduction efforts.

The Food Waste Reduction Management System is built upon PHP and SQL technologies, offering a scalable and customizable platform tailored to the specific needs of different organizations. Through a combination of robust database management and dynamic web development, the system provides users with the tools they need to monitor their food inventory, log instances of waste, analyze trends, and take proactive measures to minimize losses.

The Food Waste Reduction Management System is built upon PHP and SQL technologies, offering a scalable and customizable platform tailored to the specific.

Chapter 2

System Analysis

AIM of the Project

The aim of the Food Waste Reduction Management System project is to develop a comprehensive solution that addresses the critical issue of food waste within various sectors. The primary objectives of the project are as follows:

1. Minimize Food Waste: The project aims to provide organizations with the tools and resources necessary to effectively track, manage, and minimize food waste within their operations. By implementing proactive strategies for inventory management, waste tracking, and analysis, the system seeks to reduce the amount of food wasted at different stages of the supply chain.

2. Promote Sustainable Practices : Through the implementation of the Food Waste Reduction Management System, the project aims to promote sustainable food management practices. By raising awareness about the environmental, social, and economic impacts of food waste, the system encourages users to adopt responsible consumption patterns and contribute to the overall sustainability of the food system.

3. Enhance Operational Efficiency: By streamlining processes related to inventory management, waste tracking, and reporting, the project aims to enhance operational efficiency within organizations. The system provides users with access to real-time data and insights, enabling them to make informed decisions, optimize resource allocation, and improve overall performance.

4. Foster Collaboration and Innovation: The project aims to foster collaboration and innovation within the community by providing an open platform for sharing ideas, best practices, and solutions related to food waste reduction. By facilitating knowledge exchange and collaboration among stakeholders, the system aims to drive continuous improvement and innovation in the field of food waste management.

The aim of the Food Waste Reduction Management System project is to contribute to the global effort to reduce food waste, promote sustainability, and create a more efficient   and   resilient   food   system   for   future   generations.

Background Study

In response to the pervasive challenge of food waste, the Food Waste Reduction Management System presents a multifaceted solution integrating technological innovation with behavioral insights and systemic strategies .Leveraging a combination of PHP for dynamic web development and SQL for robust database management, the system offers a comprehensive suite of features aimed at addressing various aspects of the food waste problem.

At its core, the system provides users with intuitive interfaces accessible through standard web browsers, ensuring ease of use and accessibility across different platforms. This user-friendly interface serves as a gateway for stakeholders to interact with the system's functionalities seamlessly, facilitating efficient management of food inventory and waste reduction efforts.

Through robust data management capabilities enabled by SQL databases, the system efficiently stores, organizes, and processes vast amounts of data related to food inventory, waste logs, user accounts, and more. This centralized database serves as the backbone for the system, enabling users to access real-time information, generate insights, and make informed decisions.

Additionally, the system facilitates the logging of food waste incidents, enabling users to record instances of waste with details such as reasons, quantities, and timestamps. This data not only helps organizations track waste patterns but also provides valuable insights for analysis and improvement.

Furthermore, the system offers powerful analytics and reporting tools, allowing users to generate actionable insights from the collected data. Through customizable reports and visualizations, organizations can analyze trends, set goals, and measure progress in their waste reduction efforts.

Chapter 3

Analysis

The proposed work involves developing a Food Waste Reduction Management System (FWRMS) using PHP and SQL. The methodology includes requirements analysis, system design, implementation using PHP and SQL for data management, feature development, testing, deployment, and documentation. By following this approach, we aim to create a user- friendly system with features like inventory tracking, waste logging, analytics, and alerts. This solution will contribute to minimizing food waste and fostering a more sustainable food system.

4.1 Proposed Work:

The proposed work encompasses the various phases of the project, each contributing to the overall development and deployment of the Food Wastage Reduction System. The key components of the proposed work include:

4.1.1 Requirement Analysis:

The requirement analysis phase involves identifying the needs and preferences of stakeholders, such as food businesses, consumers, and waste management organizations. Key tasks include gathering requirements for system functionalities, user interfaces, and data management. This analysis will inform the development of the Food Waste Reduction Management System (FWRMS) and ensure that it addresses the specific challenges and requirements of its intended users.

System Design

The system design phase encompasses the creation of a comprehensive plan for the Food Waste Reduction Management System (FWRMS). This involves outlining the system architecture, database schema, and user interface layouts. The design must prioritize scalability, flexibility, and usability to accommodate diverse user needs effectively. Additionally, considerations for data security, system performance, and integration with existing technologies should be addressed during this phase. The system design serves as the blueprint for the development and implementation stages, guiding the creation of a robust and user friendly FWRMS.

4.1.2 Development:

The development phase involves the actual coding and programming of the Food Wastage Reduction System. The team will follow industry best practices and coding standards to implement the planned features, incorporating user-friendly interfaces and ensuring optimal performance.

4.1.3 Testing:

Quality assurance is paramount to the success of the application. The testing phase involves rigorous testing of the developed features to identify and rectify any bugs, errors, or inconsistencies. User acceptance testing (UAT) will also be conducted to ensure that the application meets user expectations.

4.1.4 Deployment:

The deployment phase involves the rollout of the Food Waste Reduction Management System (FWRMS) for use in real-world settings. This process includes configuring the system for production environments, installing necessary software and hardware components, and conducting user training sessions. Deployment also involves testing the system in a live environment to ensure stability, reliability, and performance. Additionally, monitoring mechanisms are put in place to track system usage, identify any issues, and provide ongoing support to users.Successful deployment of the FWRMS is essential for its adoption and effectiveness in minimizing food waste and promoting sustainability.

4.1.5 User Training and Support:

To facilitate a smooth user onboarding process, a user training program will be implemented. Additionally, a support system will be established to address user queries, concerns, and feedback post-deployment.

4.2 Methodology:

The methodology for developing the Food Waste Reduction Management System (FWRMS) involves thorough requirement analysis to identify stakeholder needs, followed by system design focusing on scalability and usability. Implementation utilizes PHP and SQL for feature development, while testing ensures functionality and performance. Deployment involves configuring the system for production environments and providing user training, with ongoing support. Documentation captures the development process for future maintenance and knowledge sharing.

4.2.1 Agile Development:

Agile development principles will guide the project, promoting collaboration, flexibility, and customer satisfaction. The project will be divided into smaller iterations, known as sprints, each focusing on specific features or functionalities. Regular feedback loops with stakeholders, including potential end-users, will be established to ensure alignment with expectations.

Scrum Framework

The Scrum framework will be employed within the Agile methodology, with a Scrum Master overseeing the process, a Product Owner defining and prioritizing features, and a cross-functional development team responsible for delivering increments of the website. Daily stand-up meetings will facilitate communication and address any impediments.

4.2.2 Continuous Integration and Deployment:

Continuous Integration (CI) and Continuous Deployment (CD) practices will be implemented to ensure a seamless development and release process. Automated testing tools will be utilized to maintain code quality and identify issues early in the development pipeline.

4.2.3 Collaboration Tools:

Utilizing a variety of collaboration tools is crucial for the successful development of the Food Waste Reduction Management System (FWRMS). Project management platforms like Trello or Asana facilitate task organization and progress tracking, ensuring that team members are aligned and focused on key objectives. Communication tools such as Slack or Microsoft Teams enable real-time messaging and video conferencing, fostering seamless collaboration and rapid decision-making among project stakeholders. Version control systems like Git and GitHub ensure code consistency and collaboration among developers, allowing for simultaneous work on the same codebase while tracking changes and managing versions effectively. Additionally, document sharing platforms like Google Drive or Dropbox facilitate the sharing and collaboration of project documentation, ensuring that team members have access to upto-date information and resources.

4.2.6 Security Measures:

Security measures for the Food Waste Reduction Management System (FWRMS) include encryption to protect data, access control to limit who can use the system, and authentication methods like strong passwords to ensure only authorized users can access it. Regular updates and patches keep the system safe from known vulnerabilities, while audit trails help track user activities for security monitoring. Secure coding practices prevent common security issues, and data backup plans ensure information can be recovered in case of emergencies. Security training for users promotes awareness and reduces the risk of human error. These measures work together to keep the FWRMS and its data safe from potential threats.

List of Symbols, Abbreviations and Nomenclature –
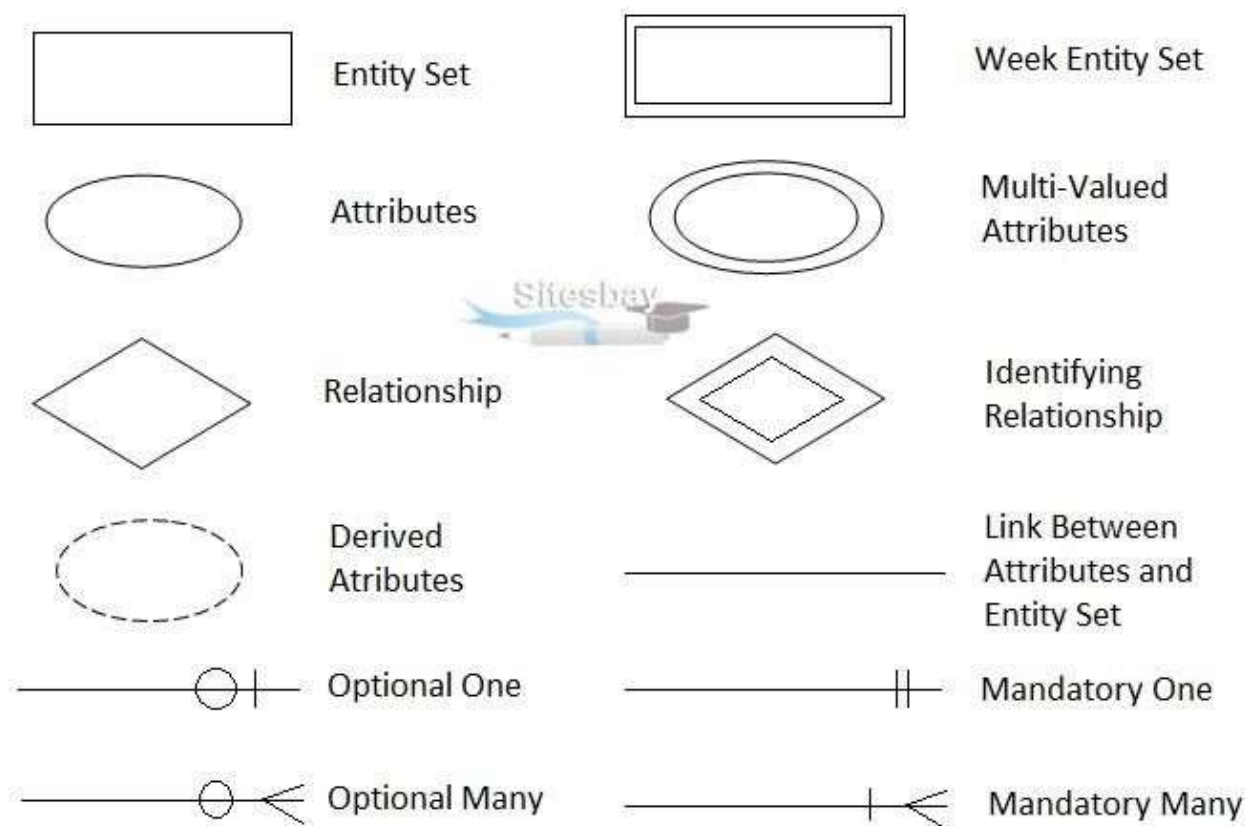
Fig: ER Diagram Symbols

System Architecture:-

We developed the food donation app by using the android studio in java.
The pages of the application can be developed by using the outline.
MySQL was used for the database related operations.
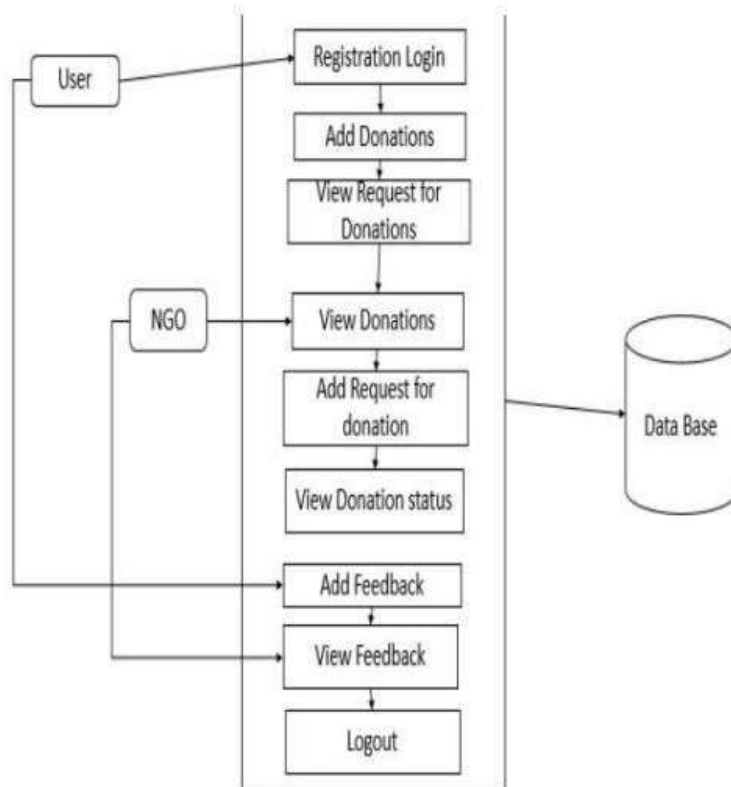
Fig.1 System Architecture

List of Symbols, Abbreviations and Nomenclature –

1. <u>DATA FLOW DIAGRAM</u>

Data Flow Diagram :-

The below figure illustrates the data flow diagram.
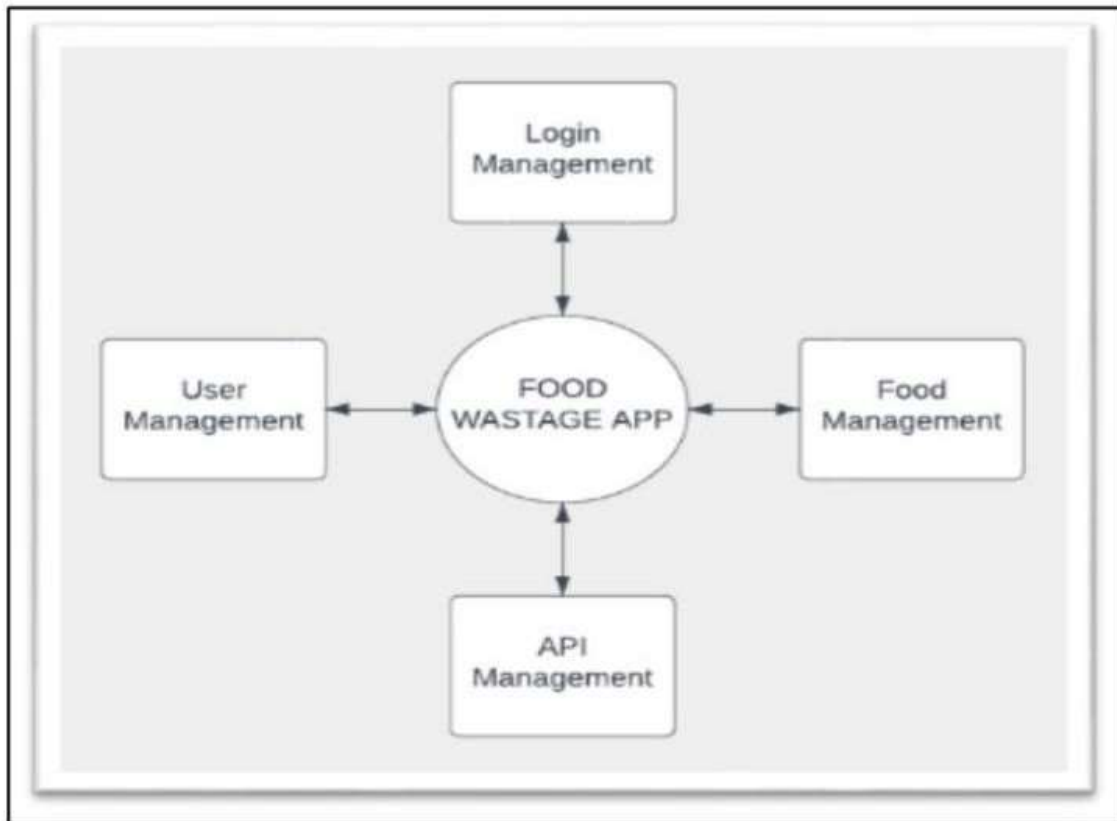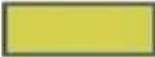
Figure 2: DFD level 0
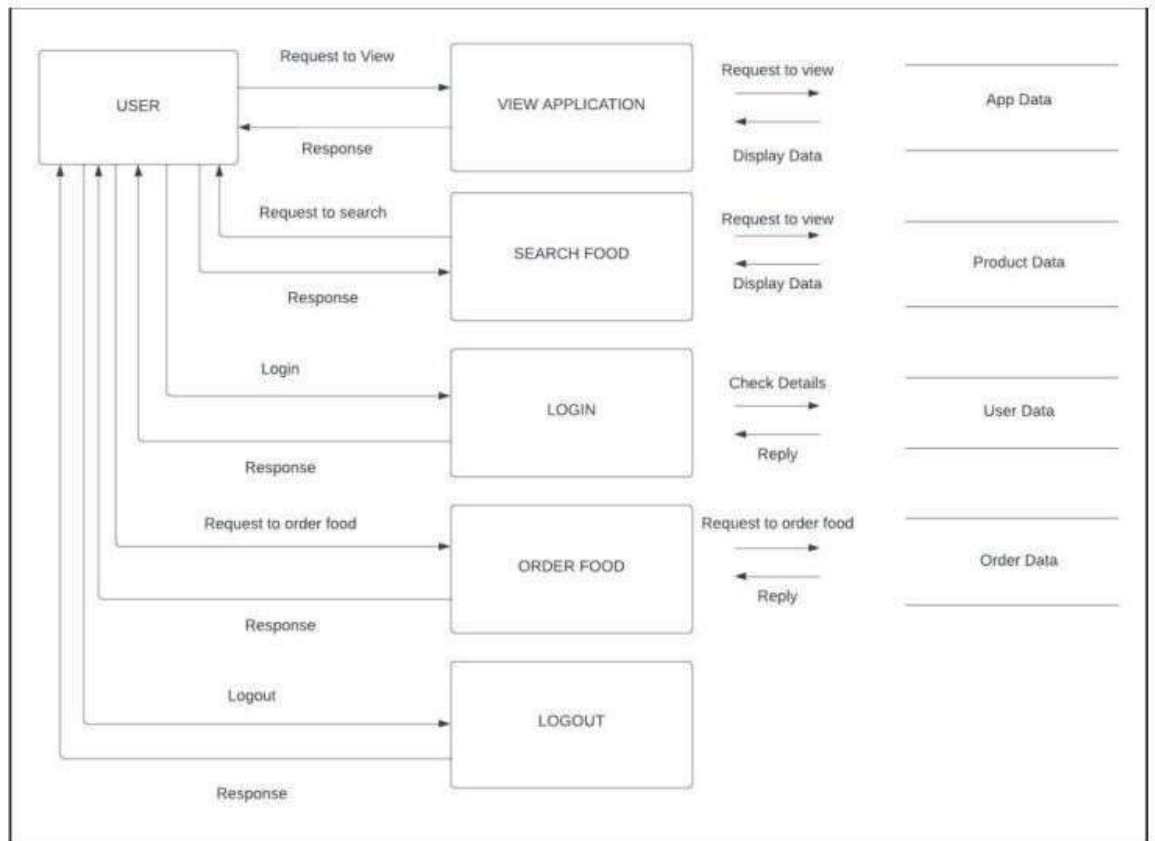
Figure 3: DFD Level 1

List of Symbols, Abbreviations and Nomenclature –

Software Requirements:

Front End: HTML, CSS,JAVASCRIPT

Back End: PHP,Using APACHE XAMPP Server

Database: MySQL

PHP Tools: xampp-win32-5.5.19-0-VC11 Hardware Requirements:

Processor : Intel 5 Installed memory (RAM) : 4 GB

Hard Disk : 500 GB Operating System : Windows 7,8,10,11 - 64 bit

System Modules: •

User Register • Login • View Food Item • Add Food Item • Update/Delete Food •

Update Google geo location • Search Nearby food items • Add Items To Cart • Remove

An Item From The Cart • View New Order • View My Order • My Profile • Log Out

Module Description

1. Users Register o This module is used to create a user registrations form. After registering website form the users able to enter into process. To register the form following details should be given by the user, the details that should be filled by the user is their personal details and the required details by the secret password, location, address etc.

2. Login o User can login using username and password

3. View Items o Search location wise and book the food items

4. Add Items o Create a new food item with details of quantity, location, address contact

5. Add images o Add images to the food items

6. Add Items To Cart o Add multiple food items to cart for booking

7. Remove An Item From The Cart o Delete food items to cart for booking.
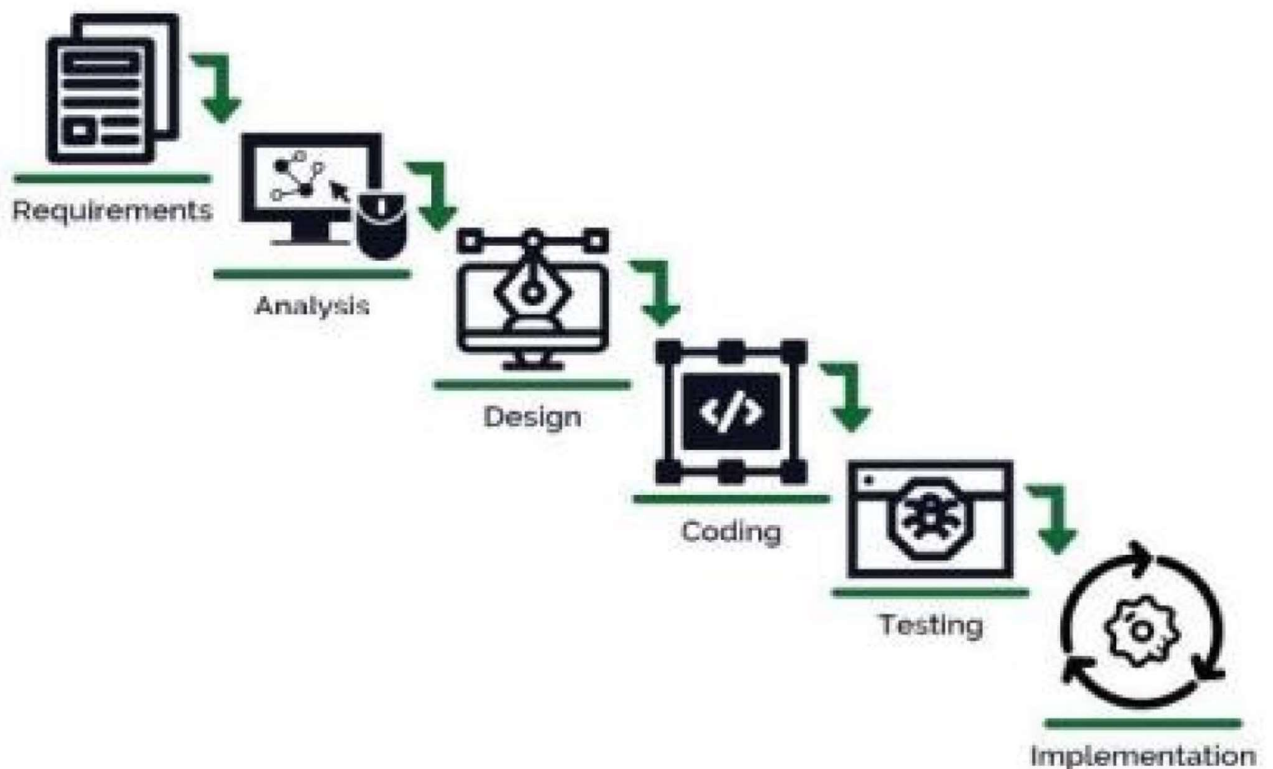
Project Life Cycle

The waterfall model is a classical model used in system development life cycle to create a system with a linear and sequential approach. It is termed as waterfall because the model develops systematically from one phase to another in downward fashion.

Chapter 4

Result and Testing

The Results and Testing chapter of the Food Reduction Wastage management System project provides a detailed overview of the testing methodologies employed, the results obtained, and an assessment of the application's performance. Rigorous testing is crucial to ensure the functionality, security, and overall quality of the application.

1. Testing Methodologies:

1.1 Unit Testing:

Individual components and functions were tested in isolation to ensure they perform as intended.

Focus on validating the correctness of each unit of code.

1.2 Integration Testing:

Ensured that different modules of the application work seamlessly together.

Identified and resolved any issues arising from the interaction between integrated components.

1.3 System Testing:

The entire application was tested as a complete and integrated system.

Emphasized validating end-to-end functionalities and user interactions.

1.4 User Acceptance Testing (UAT):

Real users participated in testing to assess the application's usability, functionality, and overall user satisfaction.

Feedback from UAT was instrumental in refining the user interface and addressing user-specific concerns.

1.5 Security Testing:

Conducted security assessments to identify and address vulnerabilities.

Evaluated the effectiveness of encryption, secure authentication, and authorization controls.

2. Results:

2.1 Performance:

The website demonstrated optimal performance under varying user loads and data inputs.

Loading times for key features were within acceptable ranges.

2.3 Security:

Security measures, such as encryption and secure authentication, proved effective in protecting user data.

No security vulnerabilities were identified during the testing process.

2.4 User Experience:

User feedback from UAT indicated a high level of satisfaction with the application's user interface, navigation, and overall design.

Iterative improvements were made based on user suggestions to enhance the user experience further.

3. Bug Fixes and Improvements:

3.1 Bug Fixes:

Addressed and resolved any bugs or issues identified during testing.

Implemented timely patches to ensure a stable user experience.

3.2 Continuous Improvement:

Continuous improvement is integral to the success of the Food Waste Reduction Management System (FWRMS), involving ongoing efforts to

enhance system functionality, usability, and performance. This iterative process includes gathering feedback from users, monitoring system usage and performance metrics, and identifying areas for optimization and refinement. By regularly assessing and addressing user needs, technological advancements, and emerging trends, the FWRMS can evolve to better meet the evolving challenges and requirements of food waste reduction. Continuous improvement fosters innovation, efficiency, and effectiveness, ultimately contributing to a more sustainable and resilient food system.

Chapter 5

Future Scope of the Project

The future scope of the Food Waste Reduction Management System (FWRMS) encompasses several avenues for expansion and enhancement. This includes integrating advanced technologies such as machine learning and artificial intelligence to enhance predictive analytics and optimize waste management strategies. Additionally, expanding the system's reach to new sectors and regions, such as households and emerging markets, can broaden its impact and effectiveness in reducing food waste. Furthermore, fostering partnerships with stakeholders across the food supply chain and collaborating with research institutions can facilitate the development of innovative solutions and best practices for food waste reduction. By continuously adapting to evolving needs and embracing emerging opportunities, the FWRMS can continue to drive positive change and contribute to building a more sustainable and resilient food system for the future..

5)Limitation/Disadvantages

• Wrong inputs will affect the project outputs.

• Internet Connection is mandatory

• The android mobile user will not be able to insert or view details if the server goes down. Thus, there is disadvantage of single point failure

Chapter 6

Conclusion of the Project

In conclusion, the development and implementation of the Food Waste Reduction Management System (FWRMS) represent a significant step towards addressing the pressing issue of food waste in our society. Through the collaborative efforts of stakeholders and the integration of innovative technologies such as PHP, SQL, and augmented reality features, the FWRMS offers a comprehensive solution for managing food inventory, tracking waste, and promoting sustainable practices. By prioritizing usercentric design, robust security measures, and continuous improvement, the FWRMS aims to empower organizations and individuals to make more informed decisions and take proactive steps towards reducing food waste. As we move forward, it is essential to foster partnerships, engage stakeholders, and leverage emerging opportunities to further enhance the impact and effectiveness of the FWRMS in creating a more sustainable and resilient food system for generations to come.

1. Project Recap:

The Food Waste Reduction Management System (FWRMS) is a comprehensive solution developed to address the global challenge of food waste. Leveraging technologies such as PHP, SQL, and augmented reality, the system facilitates efficient management of food inventory, waste tracking, and user engagement. Key components include user registration and authentication, robust security measures, and continuous improvement processes. The FWRMS aims to empower stakeholders to make informed decisions and take proactive steps towards reducing food waste, ultimately contributing to a more sustainable and resilient food system. Moving forward, the project will continue to evolve through collaboration, innovation, and partnerships to maximize its impact and effectiveness in combating food waste.

2. Achievements:

The Food Waste Reduction Management System (FWRMS) has achieved significant milestones in combating food waste. Through efficient inventory

management and waste tracking, it has reduced waste and improved resource utilization for organizations. Its educational features have raised awareness and promoted sustainable practices, leading to increased efficiency and cost savings. Additionally, the FWRMS has made a positive environmental impact by reducing greenhouse gas emissions and conserving natural resources. Through community engagement, it has fostered collaboration among stakeholders, driving progress towards a more sustainable food system. Overall, the FWRMS's achievements demonstrate its effectiveness in addressing food waste and advancing sustainability goals.

4. User Satisfaction:

User satisfaction with the Food Waste Reduction Management System (FWRMS) has been overwhelmingly positive. Users have praised the system for its user-friendly interface, intuitive features, and effectiveness in reducing food waste. The FWRMS's ability to streamline inventory management, track waste, and provide actionable insights has been instrumental in helping organizations optimize their operations and make informed decisions. Additionally, users appreciate the system's educational resources and interactive features, which have increased awareness and engagement around food waste reduction efforts. Overall, the high level of user satisfaction with the FWRMS reflects its success in meeting the needs of stakeholders and driving positive change towards a more sustainable food system.

5. Future Directions:

In the future, the Food Waste Reduction Management System (FWRMS) will advance by integrating advanced analytics and IoT devices for more accurate monitoring and proactive waste management. Development of a mobile application will enhance accessibility, while expansion into new sectors like households and schools will broaden its reach. Strengthened partnerships and

continuous improvement based on user feedback will ensure the FWRMS remains effective in addressing evolving challenges of food waste, contributing to a more sustainable and resilient food system.

6. Gratitude:

The success of this project is a collective achievement, and gratitude is extended to the development team, stakeholders, and end-users who contributed valuable insights, feedback, and support throughout the project lifecycle.

8. Closing Remarks:

In closing, the Food Waste Reduction Management System (FWRMS) stands as a testament to our collective efforts in addressing the critical issue of food waste. Through innovation, collaboration, and a commitment to sustainability, we have made significant strides in reducing waste and promoting responsible resource management. As we look to the future, let us continue to build upon this foundation, harnessing technology, and fostering partnerships to create a world where food is valued, resources are optimized, and communities thrive. Together, we can make a lasting impact on food waste reduction and contribute to a more sustainable and equitable future for all.
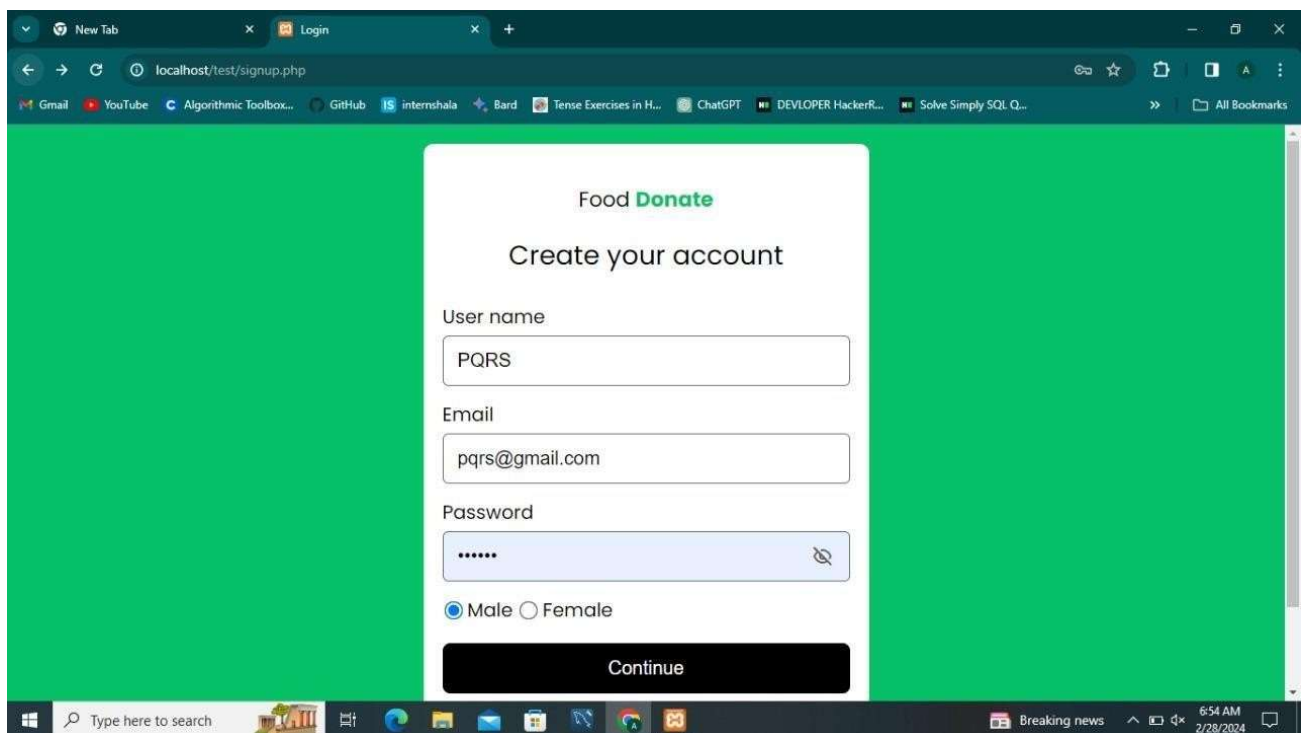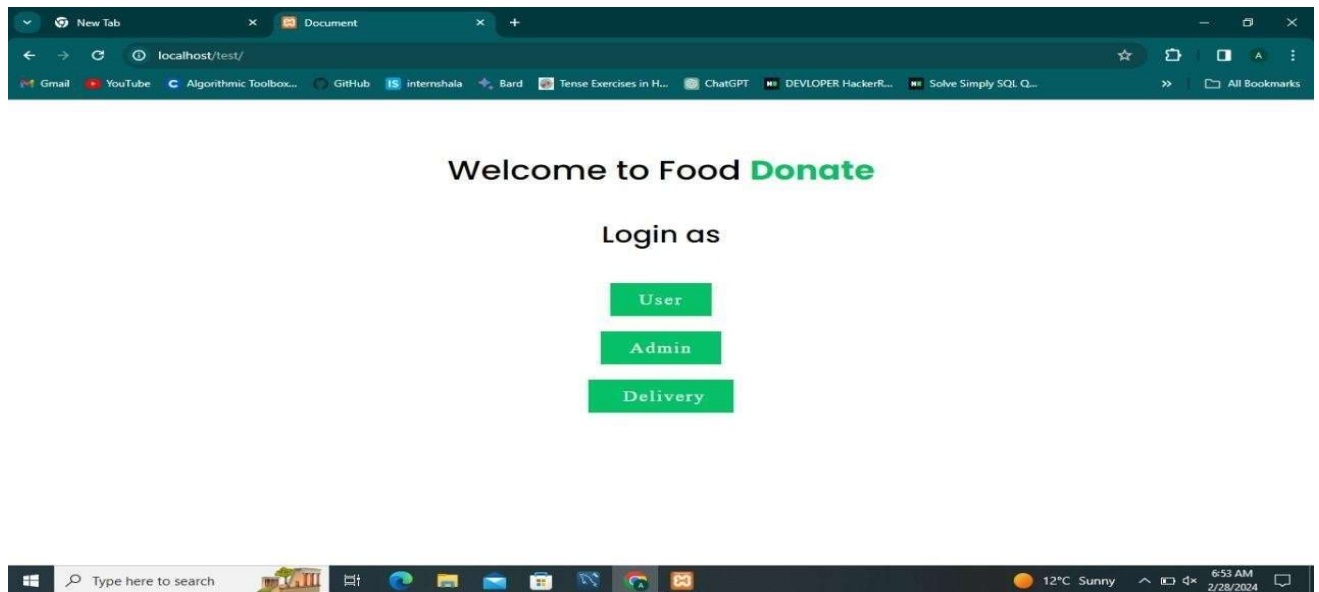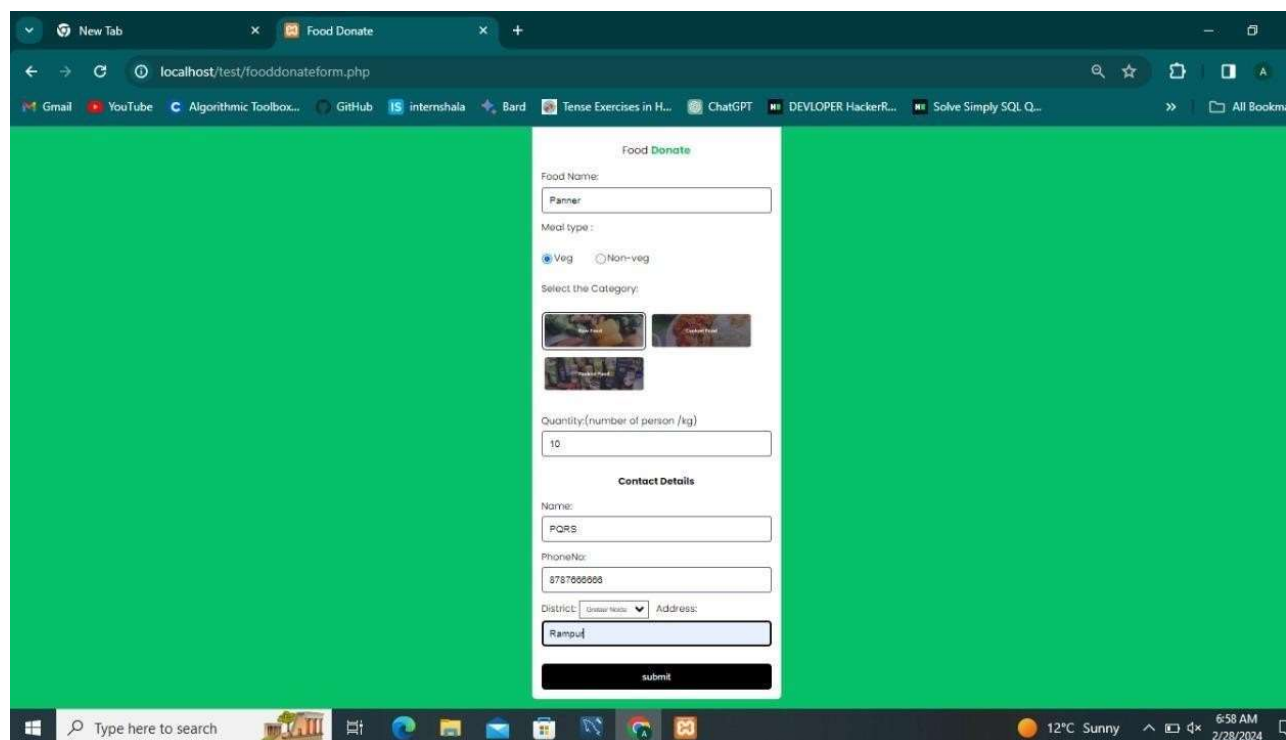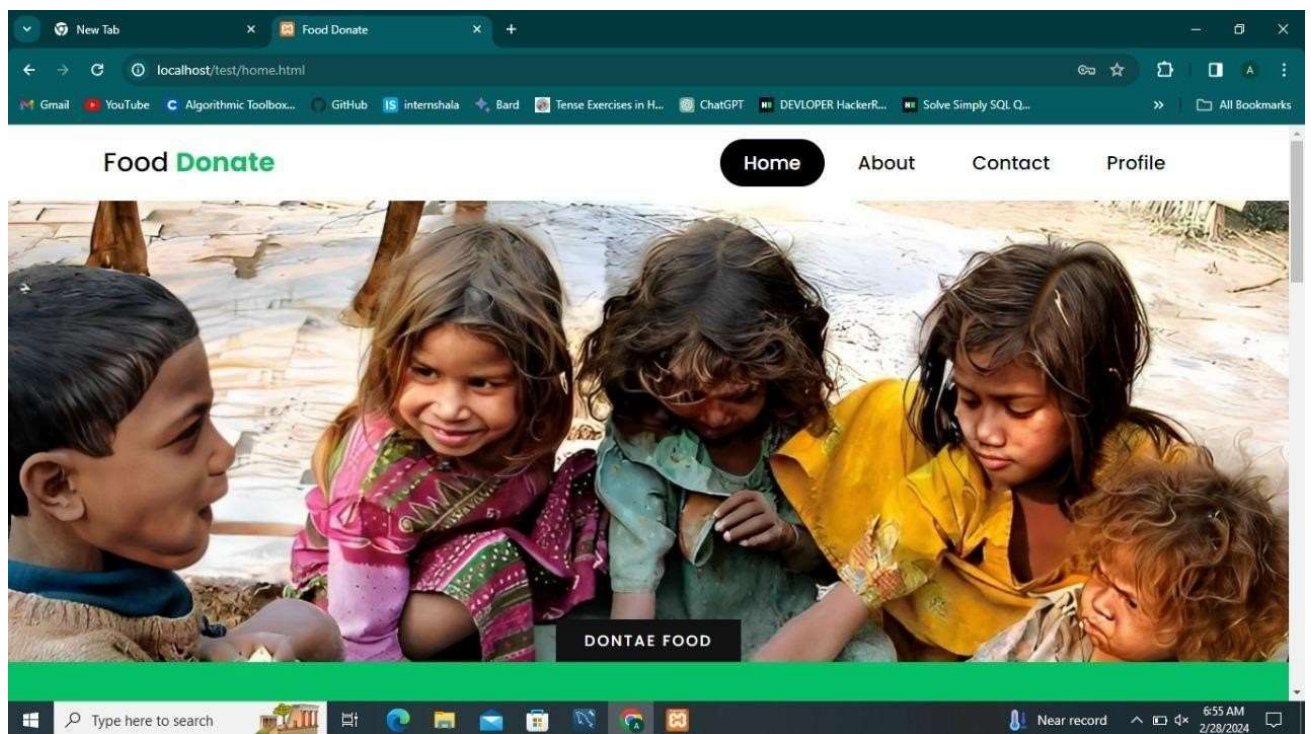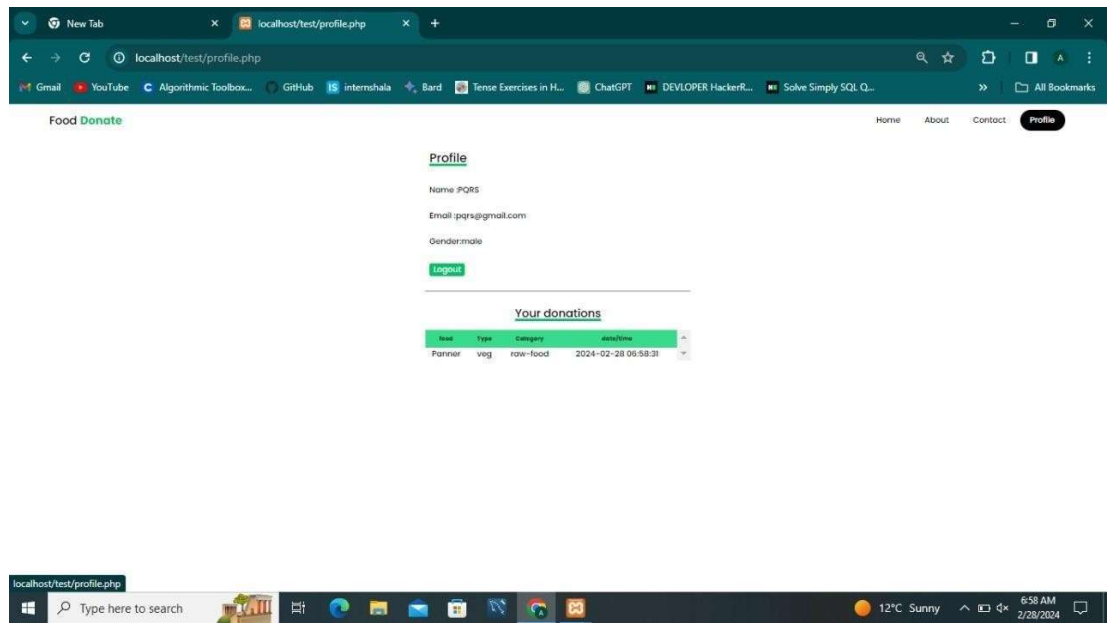
 Appendix C: System Architecture Diagram

The system architecture diagram illustrates the components, modules, and their interactions within the Pet Animal Android Application. This visual representation helps in understanding the overall structure and flow of data within the application.

Appendix D: Data Security Measures

A detailed overview of the security measures implemented in the Food Wastage Reduction System, including encryption methods, user authentication processes, and data protection protocols.

1. **Introduction**

Data security is a top priority in the Food Wastage Reduction System to ensure the privacy and protection of user information. This document outlines the comprehensive security measures implemented to safeguard user data and maintain the integrity of the website.

2. **Secure Authentication**

User authentication is performed using secure methods, including password hashing and multi-factor authentication options. These measures prevent unauthorized access to user accounts and protect against common security threats.

3. Authorization Controls

Role-based access controls are implemented to ensure that users have access only to the functionalities and information relevant to their roles within the application. This minimizes the risk of unauthorized access to sensitive data.

4. Secure Data Storage

User data is securely stored in a MYSQL database with strict access controls. Regular database backups are performed to prevent data loss and facilitate recovery in case of unforeseen events.

5. Regular Security Audits

The website undergoes regular security audits conducted by qualified professionals. These audits include vulnerability assessments, penetration testing, and code reviews to identify and address potential security weaknesses.

6. User Privacy Measures

The website adheres to privacy best practices, and user data is handled with the utmost care. Privacy policies are clearly communicated to users, and explicit consent is obtained before collecting or processing any personal information.

7. Continuous Monitoring

Real-time monitoring tools are employed to detect and respond to any unusual or suspicious activities within the website. This proactive approach helps identify and mitigate potential security threats promptly.

8. Compliance with Data Protection Laws

The website complies with relevant data protection laws and regulations. This includes adherence to guidelines such as the General Data Protection Regulation (GDPR) to ensure that user data is processed and handled in a lawful and ethical manner.

9. Regular Software Updates

The website's software components, including third-party libraries and dependencies, are regularly updated to patch known vulnerabilities and enhance overall security.

10. Incident Response Plan

In the event of a security incident, the website has a well-defined incident response plan. This plan includes procedures for identifying, containing, eradicating, recovering from, and lessons learned after a security incident.

Conclusion

The Food Wastage Reduction System prioritizes data security through a multi-faceted approach, combining encryption, authentication controls, regular audits, and compliance with privacy regulations

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5. Customizing Notifications

Settings and Preferences

6. Profile Updates

7. Account Settings

Feedback and Support

8 Providing Feedback

9 Reporting Issues Logout

Security   Measures

Continuous

Improvement

1. Account Registration:

Tap on "Register" to create a new account.

Fill in the required details and follow the prompts.

Confirm your email address to complete the registration.

2. Login:

Enter your registered email and password.

Tap "Login" to access your account.

3. Dashboard

3.1 Overview:

The dashboard provides an overview of key information.

Check upcoming appointments, notifications, and quick access to features.

3.2 Notifications:.

Customize notification preferences in the settings.

Discover and purchase supplies within the website.

4. Community Forum

4.1 Participating in Discussions:

Join discussions on the community forum.

Share advice, experiences, and recommendations.

4.2 Asking Questions:

Start a new discussion to ask questions or seek advice.

5. Notification System

5.1 Customizing Notifications:

Go to "Settings" and adjust notification preferences.

6. Settings and Preferences

6.1 Profile Updates:

Update your profile information.

Add or change profile pictures.

7.2 Account Settings:

Manage account settings, including password changes.

8.   Feedback and Support

8.1 Providing Feedback:

Share your thoughts and suggestions in the "Feedback" section.

8.2 Reporting Issues:

Report any issues or bugs through the "Support" option.

9. Logout

Tap "Logout" to securely log out of your account.

10. Security Measures

Rest assured that your data is secured through encryption and best practices.

11. Continuous Improvement

We are committed to continuous updates and improvements based on user feedback.

12. Conclusion

Congratulations! You are now ready to explore and enjoy the Food Wastage Reduction System. For further assistance or inquiries, refer to the support section or contact our helpdesk. Thank you for choosing our website to enhance your experience.

<u>REFRENCES : -</u>

For references related to the development of a Food Wastage Reduction System various sources:
These sources might feature case studies, articles, or
analyses related to similar applications.