WASTE AND SUSTAINABILITY IN HOSTEL

A PROJECT REPORT

Submitted by

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in partial fulfillment of requirements for the award of the course

AGB1211 – DESIGN THINKING

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

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K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY (AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report on **" WASTE AND SUSTAINABILITY IN HOSTEL"** is the bonafide work of **KARTHICK SUBRAMANIAN K (2303811724321053) , KESAVAN J (2303811724321055) , KUMARESAN M S (2303811724321057) , LALIT CHANDRAN S (2303811724321058)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

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Submitted for the viva-voce examination held on 5.12.24

INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

I declare that the project report on "**WASTE AND SUSTAINABILITY IN HOSTEL** " is the result of original work done by us and best of our knowledge, similar work has not been submitted to "**ANNA UNIVERSITY CHENNAI**" for the requirement of Degree of **BACHELOR OF TECHNOLOGY**. This project report is submitted on the partial fulfillment of the requirement of the award of the **AGB1211 – DESIGN THINKING.**

Signature

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KESAVAN J

KUMARESAN M S

LALIT CHANDRAN S

Place: Samayapuram

Date: 5/12/2024

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VISION OF THE INSTITUTION

To serve the society by offering top-notch technical education on par with global standards.

MISSION OF THE INSTITUTION

- Be a centre of excellence for technical education in emerging technologies by exceeding the needs of industry and society.
- Be an institute with world class research facilities.
- Be an institute nurturing talent and enhancing competency of students to transform them as all- round personalities respecting moral and ethical values.

VISION AND MISSION OF THE DEPARTMENT

To excel in education, innovation and research in Artificial Intelligence and Data Science to fulfil industrial demands and societal expectations.

Mission 1: To educate future engineers with solid fundamentals, continually improving teaching methods using modern tools.

Mission 2: To collaborate with industry and offer top-notch facilities in a conductive learning environment.

Mission 3: To foster skilled engineers and ethical innovation in AI and Data Science for global recognition and impactful research.

Mission 4: To tackle the societal challenge of producing capable professionals by instilling employability skills and human values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO 1: Compete on a global scale for a professional career in Artificial Intelligence and Data Science.

PEO 2: Provide industry-specific solutions for the society with effective communication and ethics.

PEO 3: Hone their professional skills through research and lifelong learning initiatives.

PROGRAM OUTCOMES

Engineering students will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO 1:** Capable of working on data-related methodologies and providing industry-focussed solutions.
- **PSO2:** Capable of analysing and providing a solution to a given real-world problem by designing an effective program.

ABSTRACT

The Waste and Sustainability in Hostel app is a smart solution for promoting cleanliness and sustainability within hostels. It enables students to track and complete daily tasks, such as waste segregation and personal space upkeep, while allowing administrators to monitor efforts and manage complaints.Key features include real-time task tracking, a complaint system for reporting waste issues, and an announcement board for sustainability initiatives. The app encourages accountability, enhances waste management efficiency, and fosters eco-friendly practices.By streamlining hostel maintenance and promoting sustainable habits, the app contributes to a cleaner living environment and supports broader sustainability goals.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The Waste and Sustainability in Hostel app is a tech-driven solution designed to enhance cleanliness and promote eco-friendly practices within hostels. By leveraging task tracking and complaint management features, the app ensures efficient monitoring and participation in waste management activities.Students can log completed tasks, such as waste segregation or room cleanliness, while administrators track progress and address reported issues. Real-time updates and notifications keep everyone informed, fostering accountability and timely action. The system also optimizes operations through announcements and analytics, ensuring sustainability goals are met effectively.By integrating these features, the app creates a cleaner, more organized, and environmentally conscious hostel environment, making it a vital step toward sustainable living practices.

1.2 PROBLEM STATEMENT

Hostels face significant challenges in managing waste sustainably, with inefficiencies in segregation and disposal contributing to environmental degradation. The lack of awareness and infrastructure for proper waste management results in excessive waste generation, contamination of recyclable materials, and increased environmental impact. Common issues include the absence of real-time tracking for waste segregation efforts, insufficient engagement of residents in eco-friendly practices, and limited communication about sustainable waste disposal methods.To address these challenges, there is a need for an integrated Waste and Sustainability Management System. Leveraging technology such as mobile applications, responsive dashboards, and gamified challenges, this system can track waste generation, provide personalized notifications for eco-friendly practices, and promote community engagement through leaderboards and rewards. Features such as interactive waste segregation guides, real-time waste tracking, and smart alerts for collection schedules will encourage behavioral changes among residents. By fostering collective action and transparency, the system aims to reduce the hostel's carbon footprint, enhance recycling rates, and build a culture of sustainability among residents.

1.3 OBJECTIVE

To implement and promote sustainable waste management practices within the hostel, aiming to minimize waste generation, maximize recycling and composting efforts, and reduce the overall environmental footprint.This will be achieved by raising awareness among hostel residents, providing adequate facilities for waste segregation, and encouraging energy and water conservation, with the goal of creating a greener and more sustainable living environment

CHAPTER 2

PROJECT METHODOLOGY

2.1 BLOCK DIAGRAM

CHAPTER 3
KEY PHASES OF DESIGN THINKING

3.1 EMPATHIZE

Conducted interviews and surveys with

- **Hostel Residents** Concerned about waste segregation knowledge and participation in eco-friendly practices.
- **Hostel Staff** Needed efficient ways to track waste collection schedules and monitor segregation.
- **Management** Focused on reducing environmental impact and implementing cost-effective solutions.

Key Observations

- Residents lack awareness and motivation for proper waste segregation.
- Staff face challenges with inconsistent waste collection and monitoring.
- Management seeks transparency in tracking waste reduction efforts and promoting sustainability initiatives.

3.2 DEFINE

Problem Statement Hostel residents, staff, and management face challenges in managing waste sustainably due to a lack of real-time tracking, inefficient segregation, and insufficient engagement in eco-friendly practices

3.3 IDEATE

Brainstormed features to address user needs:

- **Resident Module** Visual waste segregation guides, disposal notifications, eco-tips, and gamified challenges.

- **Staff Module** Real-time collection tracker, missed collection alerts, and a centralized dashboard.

- **Management Module** Insights on waste generation, carbon footprint reports, and smart bin integration.

3.4 PROTOTYPE

The prototype design was created using Figma, a powerful tool for building interactive and visually appealing interfaces. Figma's capabilities were instrumental in crafting dynamic dashboards and intuitive layouts that enhance user engagement and experienc:

Resident Module

- **Interactive Guides** Step-by-step instructions for proper waste segregation.
- **Notifications** Personalized alerts for disposal schedules and progress updates.
- **Gamified Eco-Challenges** Leaderboards and rewards to encourage sustainable behavior.

Staff Module

- **Collection Tracker** Real-time updates on waste collection and segregation compliance.
- **Complaint System** Tools to log and resolve waste-related issues.
- **Alerts** Notifications for schedule changes or system malfunctions.

Management Module

- **Dashboard** Visual representation of waste reduction progress.
- **Data Analytics** Insights on segregation effectiveness and carbon footprint

metrics.

- **Reports** Monthly summaries of waste generation and recycling achievements.

3.5 TEST

Conducted user testing to validate the prototype:

Testing

Residents validated guides and gamification, staff checked tracking accuracy, and management reviewed dashboards.

Feedback

Improve guides, simplify staff interface, and expand gamification challenges.

Iterations

Enhanced guides, streamlined staff inputs, and added diverse challenges.

CHAPTER 4

MODULE DESCRIPTION

4.1 WASTE DATA COLLECTION & PREPROCESSING

Purpose

- Collect data about waste generated in the hostel, including types (plastic, organic, etc.) and quantities.
- Ensure the raw data is reliable for analysis.

Implementation

- Use IoT-enabled smart bins for automatic waste tracking.
- Allow manual entry for untracked waste via the app.
- Preprocess data to remove inconsistencies.

Innovations

- Real-time waste monitoring with IoT sensors.
- Automated categorization of waste based on type.

4.2 TASK MANAGEMENT MODULE

Purpose

- Assign and track daily waste management tasks for hostel staff and students.

Implementation

- Create task lists with deadlines for segregation, recycling, and disposal.
- Enable reminders and notifications for pending tasks.

Innovations

- AI-based task optimization based on past task completion data.
- Integration with calendars for task scheduling.

4.3 USER FEEDBACK & COMPLAINTS

Purpose

- Provide a platform for hostel residents to submit feedback or complaints about waste management services.

Implementation

- Enable a "Mail and Complain" feature for users to voice concerns.
- Allow attachments (e.g., photos of uncollected waste) for detailed reports.

Innovations

- AI analysis of complaints to identify common issues and prioritize resolutions.
- Automated acknowledgment and progress tracking for complaints.

4.4 USER COMMUNICATION & AWARENESS

Purpose

- Educate residents about sustainable practices and provide updates about hostel waste management.

Implementation

- Use the app to display daily tips and progress reports on waste reduction.
- Send notifications about upcoming recycling drives or initiatives.

Innovations

- Interactive graphs showing individual contributions to waste reduction.
- Gamification: rewards for sustainable practices.

CHAPTER 5
CONCLUSION

The implementation of a Waste and Sustainability Management System is a significant step toward promoting eco-friendly practices and efficient waste management in hostels. By leveraging modern technologies such as mobile applications, gamification, and real-time data tracking, this system provides residents, staff, and management with actionable insights and transparent updates.This system addresses the common challenges of waste segregation and disposal by offering interactive guides and personalized notifications, empowering residents to participate actively in sustainable practices. Features like real-time tracking of waste collection and smart alerts ensure timely waste management, reducing inefficiencies and contamination of recyclables.For hostel staff, tools such as a centralized dashboard and collection trackers streamline operations, making waste monitoring more effective and reducing the environmental footprint. Management gains access to data-driven insights and progress reports on carbon footprint reduction, enabling informed decision-making and continuous improvement of sustainability initiatives.The inclusion of gamification—like eco-challenges and rewards—encourages collective engagement among residents, fostering a culture of responsibility and competition in adopting greener practices. Personalized feedback and progress updates build motivation, while seamless communication between stakeholders ensures that issues such as missed collections or segregation errors are promptly resolved.Ultimately, the Waste and Sustainability Management System offers a comprehensive solution that enhances operational efficiency, promotes environmental consciousness, and builds a sense of community among hostel residents. By embracing this technology, hostels can significantly reduce their waste output, achieve sustainability goals, and create a cleaner, greener living environment for all.

REFERENCES

Figma Platform

- **Overview** Figma is a collaborative interface design tool that enables teams to create apps and websites with a focus on user experience and intuitive design. It offers a wide range of pre-built components and supports real-time collaboration for seamless prototyping and design sharing.
- Official Website: Figma Official Website

Learning Through YouTube Tutorials

- **Tutorial Used** A YouTube tutorial provided step-by-step guidance for building a waste and sustainability management app.
- **Key Features Learned** Integration of real-time tracking, push notifications, and user-friendly interfaces.
- **Video Details** https://youtu.be/uQsyobT2Rv8?si=wSabGqW8wAYu77X6

This tutorial was instrumental in understanding and implementing app features efficiently.
notifications, and user-friendly interfaces.

APPENDIX A – SCREENSHOTS