Revolution in Domestic Waste Management system using Machine Learning Algorithm

SREEKANTHA B[1], SHANTARANI S B[2], SYEDA UMME KULSUM[3], SYED RASHID AHMED[4], TOUSIF SAQLAIN[5], SUJITH KUMAR N[6]

[1, 2] *Faculty, ISE Department, HKBK College of Engineering, Bangalore*

[3, 4, 5, 6] *Students, ISE Department, HKBK College of Engineering, Bangalore, India*

Abstract*— In an effort to improve community involvement and expedite the waste management process, this initiative presents a trans formative strategy. By uploading images, users may easily report issues relating to waste. Trash cans are monitored by smart cameras that are positioned strategically to provide real-time data on the amount of waste and the cans' fill levels. This technology application makes it easier to classify different kinds of waste. In addition, the technology rapidly alerts authorities to the accumulation of excessive waste in a given location, facilitating prompt cleanup actions. The companion web application encourages more community participation in maintaining cleanliness by providing user-friendly features like scheduled cleanup notifications. The project's development of the 'Social Score,' an innovative incentive system that rewards people for taking environmentally beneficial acts, is one of its distinctive features. This innovation encourages more people to take an active role in the campaign. In addition to managing waste, the project aims to promote community development. It highlights diversity and calls on everyone to contribute to making the environment greener and cleaner. The project intends to aid in the creation of more visually beautiful and healthful living environments by streamlining waste management procedures and emphasizing community involvement. The addition of smart cameras which can determine waste amounts and garbage can status is a major improvement. In line with the project's objective of developing cleaner and more sustainable communities, this technological advancement guarantees a more effective and efficient approach to environmental stewardship.

Index Terms- Social Score, Web Application, Scheduled Clean up Notifications, Machine Learning, Internet of Things, Community Engagement.

I. INTRODUCTION

Addressing the issues brought on by improper rubbish disposal in residential areas is the main goal of this waste management effort. The ultimate goal of the initiative is to create a cleaner, healthier, and more environmentally conscious living environment by encouraging residents to manage their garbage responsibly and putting different solutions into practice.

Project components:

1. Consciousness and Education: The consciousness and Instruction: A thorough education campaign is initiated by the project to raise public awareness of the importance of proper disposal of waste. This include producing and disseminating instructional materials, organizing seminars, and using digital media to share information. The community's varied population groups are served with instructional materials that highlight the harm that negligent trash disposal does to the environment and public health.

2. Initiatives for Behavioral Change: The study employs innovative strategies to modify behavior over the long term. In order to promote proper waste management practices, friendly competitions, local agreements, and incentive programs are implemented. Promoting long-lasting changes in how people dispose of their waste requires rewarding and encouraging positive behavior.

3. Community Engagement: The community's active involvement is a crucial aspect of the project. The implementation of recycling initiatives, neighborhood composting projects, and routine cleanup campaigns motivate residents to take part in waste management activities. By actively contributing to the development of a cleaner living environment, these projects foster a sense of accountability and ownership among community members.

4. Improvement of Infrastructure: It is imperative to tackle infrastructural deficiencies with waste

management.In order to improve disposal facilities, the project encourages the installation of additional trash cans, improved waste collection systems, and collaboration among local government organizations. Goals to enhance evaluations of the existing infrastructure serve as a guide for the effectiveness of waste management practices.

4. Integration of Technology: It is important to tackle infrastructure deficiencies concerning waste disposal. The initiative encourages collaboration between local government organizations, the installation of additional trash cans, and improved waste collecting systems in order to improve disposal facilities. Current assessments serve as a guide for plans aimed at optimizing the efficiency of waste management systems.

6. Incorporation: To optimize waste management processes, technology must be used to its fullest extent. To schedule and remind consumers about garbage pickup, the program develops user-friendly mobile applications. Sensor-equipped smart waste bins are utilized to maximize waste collection, and blockchain technology assists in tracking and rewarding proper garbage disposal.

II. BACKGROUND STUDY (LITERATURE)

[1]"Status and challenges of municipal solid waste management in India"

It focuses on the difficulties that Indian cities face with managing their municipal solid waste (MSWM). Draws attention to the rise in municipal solid waste production brought on by urbanization and highlights the necessity of treating garbage properly to avoid harm to the environment and health hazards. Proponents of developing formal recycling sectors and decentralized waste processing facilities in large urban areas.

[2] "Solid Waste Generation and Disposal Using Machine Learning"

It examines waste management uses of machine learning. And focuses on the steps of garbage development and disposal through the use of computer models. Examines 42 articles between 2010 and 2021. It also explains how predictive modeling, volume estimate, and waste categorization can be done with machine learning. Difficulties such as the requirement for performance bench marking and the absence of real-time waste data are identified.

[3] "The Future of Waste Management in Smart and Sustainable Cities"

It suggests a framework for centralized waste management in smart cities. Examines novel business concepts that utilize data from the product life cycle. highlights the value of sensor-based infrastructure and data collection. Advocates for integrating waste management into the entire life cycle of a product. argues for more investigation into the application of the suggested framework.

[4] "A Future Prospect for Domestic Waste Management in Qatar"

It Focuses on the issues surrounding garbage management in developing nations like Qatar. Outlines plans to cut landfill usage and boost recycling rates. And suggests managing residential garbage using a Socio-Technological System (STS). It emphasizes the importance of flexible waste management techniques.

[5] "Machine Learning and IoT-Based Waste Management Model"

It emphasizes how crucial waste management is to the creation of hygienic and safe cities. Also examines the methods of collecting waste and how they affect sustainability. Argues for more study on rehabilitation initiatives in underdeveloped nations. And supporters of technology-based trash management solutions.

[6] "Internet of Things (IoT) based Waste management in Small Cities"

wIt focuses on IoT-based garbage management in small cities. And draws attention to the drawbacks of antiquated garbage management techniques. It also investigates waste management systems that are available to homes. Explains physio-chemical and organic waste management techniques. It seeks to identify waste transfer technologies that are easy to utilize for homes.

[7] "Smart Waste Management using IoT"

It addresses issues with urban trash management. And suggests installing a "Smart Garbage Bin" to alert staff members when it is full.It describes a system with Wi-Fi and ultrasonic sensors. It also demonstrates how garbage management has become more efficient. To enhance recycling procedures, it is suggested to separate and track waste.

[8] "Smart-Bin system with waste tracking and sorting mechanism using IoT"
It focuses on employing IoT to manage waste efficiently.
suggests using an integrated sorting machine with a trash tracking system. And attempts to divide trash from the home into three categories: glass, plastic, and metal.
highlights how crucial trash segregation is to efficient recycling. It is also supporters of an inexpensive, straightforward trash management system.
[9] "Smart garbage management system for a sustainable urban life: An IoT based application"
It focuses on the difficulties associated with managing waste in crowded settings. Presents an Internet of Things-based integrated smart trash management system. Explains parts such as the communication system, display, and automatic lid mechanism. Draws attention to the advantages of automation, economy, and environmental cleanliness.

Abbreviations and Acronyms
MSWM: Municipality Solid Waste Management
STS: Socio-Technological System
IoT : Internet of Things

III. METHODOLOGY

This initiative employs a revolutionary strategy in order to improve community involvement and speed trash management operations. By uploading photos, users can quickly report waste-related problems. Meanwhile, smart cameras placed in strategic locations track garbage cans in real-time, giving information on waste volume and fill levels. This technical application facilitates quick cleanup activities by streamlining the classification of waste and rapidly alerting authorities to excessive waste accumulation. With features that are easy to use, such scheduled housekeeping reminders, the companion web application promotes community involvement. Remarkably, the project offers a novel 'Social Score' incentive scheme that incentives eco-friendly behaviors to spur proactive community involvement. The program emphasizes inclusive and our shared duty for environmental stewardship in order to promote community development beyond garbage management. The project intends to create aesthetically pleasing and healthier living environments by streamlining trash management processes and highlighting community involvement. A major technological leap, the incorporation of smart cameras ensures a more effective approach to environmental stewardship in line with the project's objective of creating cleaner and more sustainable communities.

IV. IMPLEMENTATION

The creation of goals and a comprehensive assessment of community needs precede the implementation of this waste management strategy. In order to enable convenient reporting of waste-related issues and real-time trash can monitoring, appropriate smart camera technologies and web application platforms are chosen and integrated. To involve the community, educate them about the advantages of the program, and motivate them to participate, a thorough communication plan is created. Next, an inventive incentive program called 'Social Score' is put into place to incentive community involvement and reward activities that are good for the environment. To assess the efficacy of the technology and engagement tactics, pilot testing is carried out in a specific area, and feedback is gathered for improvement. Following the initiative's good trial results, it is expanded to new areas with continual monitoring and assessment to guarantee improvement. Achieving long-term sustainability requires obtaining funds, forming alliances, and incorporating the program into the infrastructure already in place for waste management. By employing a methodical approach to implementation, the program successfully increases community involvement and optimizes waste management procedures, hence promoting cleaner and more sustainable communities.

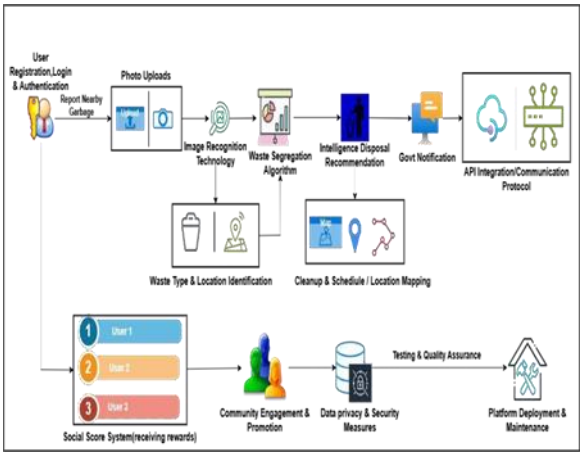

Figure 1: Architecture of the System

CONCLUSION

Lastly, the comprehensive and original answer to the persistent issue of careless rubbish dumping in communities is offered by the proposed waste management project. By integrating the core ideas of system architecture with a user-centered design approach, the project aims to not only lessen environmental pollution but also encourage a culture of responsible waste management within communities. The waste management platform's behavior, structure, and essential elements are outlined in the solid system architecture, which serves as a framework. This conceptual model ensures a systematic and organized approach to project implementation by acting as a guide for developers. In addition, by placing a strong emphasis on comprehending and addressing the diverse needs and preferences of the community, the user-centered design workflow humanizes the development process. The design process makes use of strategic stages including user research, prototyping, and continuous testing in an effort to create an engaging and user-friendly interface. Adaptive algorithms, intelligent trash cans, and smartphone apps are examples of technology that the project has included to show how committed it is to using innovation to find lasting answers. Developing positive behavioral changes is the project's ultimate goal, not only providing a technical fix. The initiative intends to use technology to incentivise right practices, foster community involvement, and promote proper garbage disposal behaviors in order to transform neighborhoods into cleaner, more sustainable ecosystems. In essence, the waste management project aims to establish a cleaner, more conscientious environment through community-wide participation. Developing positive behavioral changes is the project's ultimate purpose, not only providing a technical fix..

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