



SMART DUSTBIN FOR STREET FOOD SELLER

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Abstract

Waste management in urban environments faces increasing challenges due to population growth and rapid urbanization. Traditional methods of waste collection and disposal are proving insufficient. To address these challenges, smart dustbins, utilizing Internet of Things (IoT) technology, have emerged as a promising solution. Equipped with sensors, actuators, and communication modules, these bins efficiently collect, segregate, and manage waste. By optimizing collection processes, reducing operational costs, and minimizing environmental impact, smart dustbins are revolutionizing waste management. Key components include sensors for waste level detection, actuators for lid operation or waste compaction, and communication modules for data transmission. Various sensor technologies such as ultrasonic, infrared, or weight sensors accurately measure fill levels. Additionally, cameras enable real-time monitoring and waste classification. Smart dustbins optimize collection routes and schedules by continuously monitoring fill levels. This enhances operational efficiency, reduces fuel consumption, and lowers carbon emissions. Furthermore, waste segregation at the source streamlines recycling and resource recovery. Automated sorting of recyclables conserves resources and minimizes landfill waste. Integration with IoT platforms enables data-driven decision-making and performance monitoring. Analysis of collected data provides insights into waste generation patterns, behavior trends, and operational efficiency. This informs waste management strategies, resource allocation, and educational campaigns promoting waste reduction and recycling.

Introduction

Garbage management is a critical aspect of urban living, particularly in densely populated areas like India. With waste generation per capita ranging from 200g to 500g, the country faces significant challenges in waste disposal and collection efficiency. The Indian Government is grappling with the increasing waste generation, with estimates reaching up to 95 million tons in recent years. Overflowing garbage bins are not only unsightly but also pose health hazards due to breeding insects and mosquitoes. The concept of smart cities, championed by India's Prime Minister, underscores the importance of cleanliness and efficient waste management. Traditional waste collection methods are proving inadequate, necessitating the integration of technology. By leveraging electronics and data analytics, smart dustbins offer a revolutionary solution to urban waste management. These bins, equipped with sensors and network connectivity, enable real-time monitoring and tracking of waste movement across cities. Such innovation promises to transform waste management in upcoming smart cities, ensuring a cleaner and healthier environment for all. Efficiency Improvement: IoT-based dustbins equipped with sensors can significantly improve waste management efficiency in residential areas like Oluyole, Molete, and Foko. By accurately detecting fill levels and prioritizing waste collection, these smart dustbins reduce overflow instances and ensure timely disposal, leading to cleaner surroundings.

Environmental Impact: With food waste being the predominant component in all locations, IoT-based dustbins offer an opportunity to mitigate environmental impact. By facilitating better waste segregation and recycling, these smart systems can minimize landfill usage and promote sustainable waste management practices, contributing to a healthier environment for residents.

Community Health: Effective waste management is crucial for maintaining public health, especially in densely populated areas. IoT-based dustbins help prevent the spread of diseases by reducing

instances of overflowing bins and minimizing exposure to waste-related hazards, thereby promoting better community health outcomes

Component	Oluyole (%)	Molete (%)	Foko (%)
Food Waste	48.6	39.9	41.3
Grit/Yard Waste	12.8	21.0	19.5
Paper	8.5	10.2	9.8
Nylon	7.3	8.6	7.9
Plastic	10.4	9.8	11.2
Metal	5.2	4.7	5.1
Glass	7.2	5.8	4.2

Table 1 shows the comparison of the various components of solid waste at Oluyole, Molete and Foko areas.



This presents a comparison of various components of solid waste at household level in Oluyole, Molete, and Foko areas. Food waste was found to be the major waste generated across all three locations, likely due to their residential nature. Grit or yard waste, comprising household sweeping and leaves dropping, followed as the next significant component. Paper, nylon, plastic, metal, and glass were also observed in the waste composition, with varying percentages across the locations. An ANOVA test was conducted to determine if there were significant differences among the physical components of solid waste across the three locations.

The findings were in consonance with the results obtained in a similar study, and can be attributed to the similarity in geographical location and areas of both studies. Generally, the result showed that majority of the waste generated in the areas are biodegradable waste (food and grit) compared to non-biodegradable waste (paper, nylon, plastic, glass and metal), which is in line with findings from recent similar studies, which showed that most of the solid wastes in Ibadan are biodegradables

The results also indicate that biodegradables make higher fraction than other components of the household solid waste stream. The percentage composition of the waste component was however, different from the observed non-residential areas of the University area.

Conclusion:

Hence better facility of collecting garbage and transportation should be provided. Since, this system provides the information when the bin gets completely filled with garbage, it reduces the number of times the arrival of vehicle which collects the garbage. This method finally helps in keeping the environment clean. Thus, the garbage collection is made more efficient

The implementation of smart dustbins not only improves cleanliness and hygiene but also contributes to environmental sustainability by reducing the amount of waste sent to landfills and promoting recycling. Furthermore, these intelligent bins have applications beyond urban environments, offering benefits to



businesses, public spaces, and industrial facilities.

As cities continue to grow and face increasing challenges related to waste management, smart dustbins offer a scalable and cost-effective solution for building cleaner, healthier, and more sustainable communities. By embracing this innovative technology, we can work towards creating a brighter future for generations to come

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