# Book A Bin (Hassel Free Garbage Collection)

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## Abstract

Garbage collection and disposal is a huge issue around the world. With global warming happening in the world, it has become much more important to dispose of garbage properly. The garbage disposal system nowadays has a few flaws that are no proper segregation of waste and waste contamination. The waste is thrown in unauthorized areas when the disposal truck is missed especially in the system in India. Also, in many areas the disposal truck never followed the schedule leading to contamination of waste in those areas. Most people do not know the importance and the way segregation must be done. These are a few issues which have been addressed in this research. The solution for most problems has been prescribed in this research.

**Keywords:** Garbage Collection System, Garbage Management System, Arduino and NI my RIO GPS Detection System, Geofencing technology, API [Application Programming Interface].

## 1. Introduction

Not only in India, many countries in the world have a major issue with garbage collection and disposal. This has been researched by many researchers and their solution relies on IoT (Internet of Things). Many researchers have mentioned and worked on building a bin that is integrated with the mobile app which checks the bin status and informs the concerned authorities to dispose of the waste. This approach is expensive for common people and the segregation of waste is not done properly. For the same the proposed solution is an application which helps common people book a slot. In the timing slot they will be able to give the segregated garbage to the garbage collector. This approach does not require any special bin. This application also works on giving credit points to the user who has kept their garbage collection on time and has segregated their waste. There are numerous features that we have added in the design of the app based on the survey that we have performed.

## 2. Literature Review

[5]. The paper presents "Dumpy," a mobile app that integrates IoT sensors and reward systems to improve household waste management and composting. It builds on prior research by enhancing real-time waste monitoring and route optimization while introducing user incentives. The system promotes sustainability by rewarding users for reducing waste and optimizing collection logistics. Key benefits include improved efficiency, cost savings, and better hygiene. However, challenges include high initial costs, connectivity reliance, and scalability issues in urban and rural settings.

[6]. Improving Efficiency of Garbage System paper mainly focuses on dealing localized problems or issues like noise pollution, missed pickups, and operational inefficiencies. So, they introduced a user centric mobile app is built using frameworks like React, Native Firebase to deal with such above problems. The app provides real time notification, billing, and complaint resolution. The app focus was only on small scale areas. Due to this they had to

face new problems like sampling bias, dependent on Technology, updation of account from driver side, Security, Scalability, IOT Integration.

[12]. The paper introduces "Breathe Safe," an IoT-based smart waste collection system designed for Dhaka City. It uses ultrasonic sensors and Wi-Fi modules to monitor bin fill levels and updates a mobile app with real-time data via Google Maps. The system focuses on Dhaka's specific urban challenges and provides route guidance for waste collectors to improve efficiency and reduce pollution. It builds on previous research by integrating low-cost infrastructure and enhancing usability, while also differing by offering real-time navigation and targeting megacity needs. Testing in Dhanmondi showed 100% accuracy in data transmission. However, limitations include manual bin selection, lack of liquid waste detection, and limited power sources. Future improvements aim to include automation, solar power, and broader scalability throughout the world.

[14]. This paper mainly proposes on decentralized garbage collection algorithm for real-time collaborative editors (RCEs) on mobile devices. It builds on prior Operational Transformation (OT) work and introduces dependency trees to manage log data efficiently without global synchronization. Unlike earlier methods focused on static groups and desktops, it supports dynamic user groups and mobile constraints like limited storage and power. The system achieves fast response times (<100ms) and low overhead, even with large logs. Key innovations include blocking-free coordination and resilience to user join/leave scenarios. Limitations involve blocking during cleanup, reliance on stable networks, and no offline editing. Future work aims to improve scalability, offline support, and security.

[10]. This paper the Author presents a mobile app for real-time garbage truck tracking in Malaysia, integrating GPS, Firebase, and Google Maps to alert residents about collection schedules and improve transparency for authorities. Building on existing IoT and logistics frameworks, it differs by focusing on community engagement and combining tracking with schedule management. The app was successfully developed and tested, though issues like GPS inaccuracies and driver unfamiliarity caused some delays. It contributes a user-centric approach to urban waste management. Limitations include lack of dynamic routing and limited real-world testing. Future improvements aim at scalability, user feedback integration, and energy efficiency.

[8]. In this paper, the Author mainly focuses on to design best routes for garbage collection and also reduce fuel consumption. So, they came up with a smart Garbage system made up of IOT sensors and routing algorithms such as Dijkstra, Bellman Ford algorithm and so on. It provides best and shortest routes, accurate results on monitoring garbage bin levels daily by this system helped to reduce fuel consumption of the garbage trucks and garbage collection time is also reduced. This helped to manage waste and protect environment. Even being a more efficient system, it has some challenges to be dealt which are like to reduce costs and energy consumption of sensors, has to constantly monitoring the traffic to give best route, wastes have to be properly segregated.

[9]. This paper focuses on dealing mainly to design best routes for garbage collection, segregate waste and properly dispose the waste to solve this problem, a smart garbage bin system (SGBS) made up of Iot sensors and a mobile app that helps to understand household garbage disposal behavior which helps to identify the type of waste like dry or wet waste and analyzes patterns of disposing waste. This system provides waste management, helps to inculcate environment friendly habits, accurate results in monitoring bin levels, less energy is consumed. Even being a more efficient system, it has some challenges to be dealt which are like to increase battery life by using renewable energy like wind energy, solar and so on, it is dependent on user data, expand scalability, and link with government bodies.

## 2.1 An Automatic Garbage Collection and Dumping System: A Novel Design Using Arduino and NI my RIO

[11]. This paper gives a detailed information about garbage management system that automates garbage dumping and collection using Arduino platforms. It used ultrasonic sensors to find garbage levels in bins. The software RIO processes sensor data and starts its activities. GSM module sends alert messages to garbage management when the bin is full. An Arduino-controlled robotic arm dumps waste into bin. This cuts human involvement and raise garbage handling hygiene and efficiency which helps to maintain ecosystem.

## 2.2 Mobile applications using GPS

[10]. Residents can ask for garbage pickup via a mobile app, which includes GPS tracking of trucks and an administrative panel managing routing and progress. It facilitates effective route planning, guarantees timely service, and enhances communication.

## 2.3 Plant Sound-Based Detection System

[1]. This technique applies machine learning to garbage truck audio signals in order to identify collection events. Automatic verification of garbage collection without depending on GPS or manual inspections is made possible by sound sensors set on trucks or around bins.

## 2.4 Web Based System

[4]. Users of a web-based system can report bin status and ask for pickups. Routes are managed by admins, who also address complaints; data is kept centrally for analysis. This system helps data-driven decision- making by increasing openness and quality of service.

## 2.5 Geofencing technology

[2]. This technique will be used to augment the suggested system's real-time GPS tracking and monitoring solution for garbage collection trucks. By means of GPS for tracking, GSM for contact, and a web-based interface for monitoring, the system helps to ensure efficient and thorough waste collecting by sending alerts when cars enter or leave set areas. It boosts route adherence, lowers gasoline use, and increases openness and responsibility in service delivery.

## 2.6 API Enabled Smart Garbage Management System

[3]. An IoT-based smart garbage management system described in this document uses sensors to track bin fill level and offers real-time data via a web API. There are a combination of GSM systems and ultrasonic sensors which send updates to a cloud server. By alerting officials when bins are full, the system hopes to maximize garbage collection and thereby enhance resource allocation and lower long distance travels. Users can dynamically monitor bin status and arrange pickups using a mobile and web interface.

Ultrasonic sensors alert about the bin garbage levels. Module for real-time server updates using GSM.API- based architecture allowing for adaptable integration. Web and mobile dashboard for monitoring and management. Notifying system to stop bin overflow.

## 3. Methodology

The proposed solution to the challenges we found in the literature review is an app that runs on any mobile. This app helps the user to track the garbage truck and also has a special feature. The feature is to book a slot when the user is free to dispose of the garbage. The garbage collector who is free will collect and dispose of the garbage. The flowchart below describes the proposed solution:

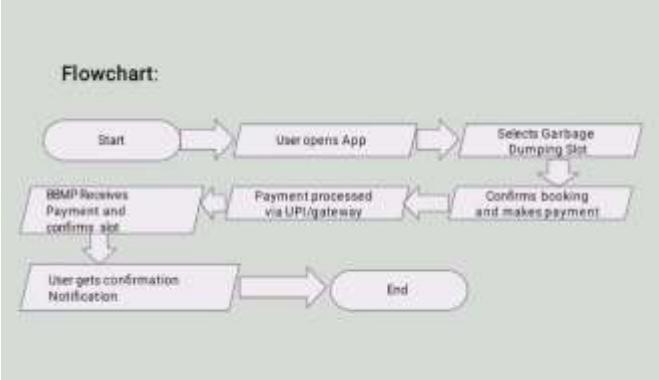


Figure 1: Flowchart of Proposed Solution The block diagram describes how the internal features work:

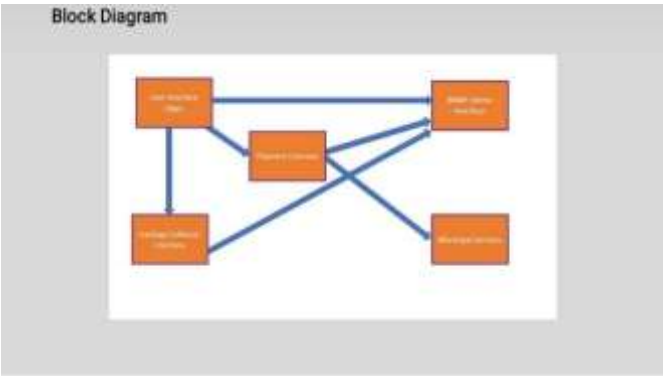


Figure 2: Block Diagram of Proposed Solution

## 4. Conclusion

The proposed solution aims to reduce garbage in unauthorized areas. This solution will help regulate garbage disposal with discipline. People will also learn to dispose the waste regularly and the importance of waste segregation. The previous data as mentioned in the literature survey has definitely been researched to learn more about the garbage problems and the proposed solution has been mentioned in this research. This paper has guided through all the challenges of waste management. Concluding from the paper the garbage collection needs to be cleaner and in discipline. The challenges will be there in any proposed solutions but overcoming them will result in the betterment of the country. Our whole objective is the development of our country which will be achieved step by step.

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