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# Smart Dustbins System using Arduino Board with GSM Module

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**ABSTRACT:**The current rate of population growth creates an unsanitary environment for a society's citizens in terms of waste generation. This rapid waste generation contributes to the spread of infectious diseases in the environment. We can see overflowing garbage bins in our neighbourhood, as is typical of the traditional municipal system. In traditional systems, solid waste management is critical, and it is becoming dangerous in most populated areas. This paper proposes a smart bin mechanism (SBM) for smart cities to maintain city cleanliness and real-time monitoring of trash bins. To accomplish this, we must create an automatic smart dustbin that can detect the current status of the garbage bin and send the information to the garbage collection authorities, as well as allow people to update the garbage. They can take immediate action to empty. It ultimately contributes to societal cleanliness, and thus the spread of diseases caused by waste material is reduced.

**KEYWORDS:**Smart: Waste; Bin; Android; GSM.

## I. INTRODUCTION

Nowadays, waste management is one of the first issues that the world faces, regardless of whether the country is developed or developing. The main issue in waste management is that public trash cans overflow well before the start of the sequential cleaning method. Pollution in the atmosphere could be a significant contributor to recent advancements.

Recent urbanisation in the world's developing countries, population growth, and increased human activity. The pattern of production and consumption has resulted in the generation of massive amounts of waste, which must be properly disposed of, treated, and managed in order to ensure a sustainable environment and a decent standard of living for the growing population. Current waste management practises are ineffective and inefficient in dealing with rising waste levels.

This problem has arisen as a result of the traditional approach. This paper conducts a systematic review of existing literatures in order to identify and characterise active research activities on smart waste bins that will allow for effective waste management. There is a great need for this Smart technology to be deployed on a large scale in the world's developing nations in order to create a sustainable, healthy, and clean environment. The cost of implementing such solutions, however, remains relatively high.

Somewhat technology depend on the domain of IoT and machine learning along with the mobile apps for the alert system along with GPS.



The majority of virus and microorganism infections occur in an impure environment. Nowadays, it is necessary to protect the environment by utilising technology sources. IoT-based mostly Embedded system is that the technology by which an Android embedded developer connects multiple embedded devices to the internet. So, in this paper, we have a tendency to square measure about to propose a smart garbage management system supported IOT for urban areas acts as a part of the innovative systems to keep cities clean. This method monitors the dustbins in various areas and provides updates on their location on a site. The Android app developed here makes it simple to obtain and update information.

## II. RELATED WORK

Many countries are experiencing cleanliness issues, and various technologies for handling solid waste management systems have been introduced.

The authors of [1] used ultrasonic sensors and the Arduino Mega microcontroller to measure the level of waste in the dustbin. The disadvantage of this model is that in order to see the waste values on specific days or times, one must open the server or check the database, and it also requires a separate Wi-Fi module to connect to the internet. The proposed model attempts to provide the values via a mobile app, and by utilising the NodeMCU board, we eliminate the need for the Wi-Fi module.

The researchers in [2] used an ultrasonic sensor linked to the NodeMCU to determine the amount of waste in the bin. Their model employs a PIR sensor, which detects any motion in its vicinity. A buzzer is connected to the model, which buzzes whenever the ultrasonic sensor detects movement or gives a reading for the level of waste.

The paper [3] employs RFID scanners to provide individual IDs for dustbins, which can be used to direct us to the location of the dustbin. A photoelectric sensor is used to detect metal items in the waste, and a weight sensor is used to keep track of how much the dustbin can hold before it overflows. The IR sensor communicates with a local base station, which can monitor the status of the bin. If the dustbin reaches the threshold level, it emits a noise and transmits the status to the station.

Waste management solutions face their own set of challenges. [4] proposes using only a GSM module and an ultrasonic sensor to send the status of the bin directly to the registered phone number. Although the number of sensors is reduced, a disadvantage of this model is the limited number of contacts and messages or calls depending on the SIM plans. The model proposed in this paper makes it simple for authorised and registered members to keep track of the bin's status.

Some researchers [5] and [6] use the IR sensor to make the trash can smarter by monitoring the waste that is scattered outside the trash can. The system's analysis and monitoring can reduce human effort in cleaning areas on a daily basis, thereby making the world a cleaner place.

SAISHARAN (5,May2015) proposed Smart Dustbins can significantly reduce garbage accumulation along the roadside, thereby controlling the spread of many diseases. It can help to reduce pollution as well as the consumption of garbage by street animals. This Smart Dustbin can make a significant contribution to a clean and sanitary environment when constructing a smart city. [7]

[8] This paper proposed a smart dustbin management system that uses IoT as hardware and an ionic framework as software to ensure that dustbins are cleaned as soon as the garbage level reaches its maximum. If the dustbin is not



cleaned within a certain amount of time, the record is sent to the higher authority, in our case the administrator, who can take appropriate action against the concerned employee.

[9]Narayan Sharma, NirmanSingha, and TanmoyDutta proposed (9 September 2015) The designed smart-bin will send data about the levels of garbage collected in various parts of the city/town. The created dataset can be analysed to gain numerous insights. A historical data set will be created from the collected data set over time.

[10] The proposed system is based on an Arduino Nano board and an ultrasonic sensor to monitor the container's fullness level and send SMS alerts via a GSM module. The system is powered by a lithium battery power bank that is backed up by a solar cell panel. The system allows you to charge external portable devices with the power bank. Furthermore, when the bin is in use, the system will record usage and fullness events on a memory card, which is also used to play an audio message through a speaker.

[11] Urbanization has risen dramatically in recent decades. At the same time, waste production is increasing. Waste management has been an important issue to consider. This paper is one way to help this worthy cause. The smart bin in this paper is built on a microcontroller-based platform Arduino Uno board, which is interfaced with a GSM modem and an ultrasonic sensor. An ultrasonic sensor is installed at the top of the dustbin to measure its height. The minimum height is set at 10cm.

### III. EXISTING SYSTEM

The ULTRASONIC SENSOR and MOTION SENSOR are used in the current method. The system employs an automatic lid opening and closing method, as well as microcontroller programming.

### IV. PROPOSED SYSTEM

One of the sensors uses an Ultrasonic signal to monitor the level of garbage in the dust bin, and if the level exceeds the set point, an Arduino programme sends a warning signal to the appropriate authorities. As a result, the hygiene environment is preserved. The GSM module and GPS module are used for signal transmission and location tracking, respectively.

### OBJECTIVES

- ✓ Ultrasonic sensors were used to determine the height of the garbage.
- ✓ Arduino is used to connect all of the data transformation modules.
- ✓ When the dust bin is full, the GSM module will send a message to the user.
- ✓ The garbage is updated using an Android app.

### V. METHODOLOGY AND WORKING

This method is proposed in order to keep the city clean and neat. In this method, an ultrasonic sensor detects the level of garbage in the dustbin and sends a message to the appropriate authorities, along with the location. The Android app has also been developed for the people's use; if they identify any of the dustbins or a large amount of garbage, they can

update the pick of that location, and the location will be updated to the concerned authorities, and these interfaces are linked to the ARDUINO.

Block Diagram



The proposed model ensures that solid waste management is done efficiently. The effectiveness stems from the fact that real-time monitoring of solid waste management aids in the timely removal of garbage and the prevention of harmful waste from polluting the environment. The use of advanced controllers such as Arduino in conjunction with a GSM and GPS enabled system improves the overall effectiveness of the solid waste collection and disposal system. As a result, the smart dustbin can play an important role in achieving a clean and green environment.

## VI. CONCLUSION

The proposed model ensures that solid waste management is done efficiently. The effectiveness stems from the fact that real-time monitoring of solid waste management aids in the timely removal of garbage and the prevention of harmful waste from polluting the environment. The use of advanced controllers such as Arduino in conjunction with a GSM and GPS enabled system improves the overall effectiveness of the solid waste collection and disposal system. As a result, the smart dustbin can play an important role in achieving a clean and green environment. This project will help to eliminate or reduce the problem of garbage disposal. This system also aids in the detection of fake reports, which reduces corruption in the overall management system. As a result, a good waste management system makes garbage collection more cost effective.

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