

# Efficient Solution to the Waste Management Process using IOT for Smart Trash Can

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**Abstract :** *With the increasing popularity towards Smart Technologies Internet of Things (IOT) has been the current trend in the technology development towards smart world. The major problem addressed in this paper is about efficient garbage management system through a centralized system monitoring the capacity levels of the trash bins in and around the city from a common place.*

*The aim of the project is to eliminate the difficulties caused during the process of cleaning the trash bins located around the cities such as unnecessary traffic, pollution, and chaos among the busy running people. With this project into effect in the towns and cities officials responsible for cleaning of trash cans can schedule their cleaning process according the capacity levels of the trash cans. In addition to this it gives an efficient solution towards waste management process and maintains the green nature of the atmosphere and the environment.*

**IndexTerms – IoT, WasteManagement, GSM, Microcontroller**

## I. INTRODUCTION

Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. These researches led to the birth of a sensational gizmo, Internet of Things (IoT). Communication over the internet has grown from user - user interaction to device – device interactions these days. The IoT concepts were proposed years back but still it's in the initial stage of commercial deployment. Home automation industry and transportation industries are seeing rapid growth with IoT. Yet not many articles have been published in this field of study. This paper aims in structuring a state of the art review on IoT. The technology, history and applications have been discussed briefly along with various statistics. Since most of the process is done through the internet we must have an active high speed internet connection. The technology can be simply explained as a connection between humans-computers-things. All the equipment's we use in our day to day life can be controlled and monitored using the IoT. A majority of process is done with the help of sensors in IoT. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmits them to its control centre. By this way we can monitor environment changes remotely from any part of the world via internet. This systems architecture would be based on context of operations and processes in real-time scenarios. Smart collection bin works in the similar manner with the sensors namely Ultra Sonic sensor that indicates its different levels respectively. The US sensors will show us the various levels of garbage in the dustbins and also gets activated to send its output ahead when its threshold level is crossed. This details are further given of the microcontroller (ATmega 328P) and the controller gives the details to the transmitter module (GSM module). At the receiver section a Centralized System is needed to be connected internet so the details of the garbage bin are displayed onto the HTML page in web browser of our computer.

## II LITERATURE REVIEW

This is not an original idea, for the implementation of smart garbage bin; the idea has existed for many years, After the IoT field finding its grip in our lives. This is, however an original plan for designing a smart garbage bin with weight sensor, IR sensor and Wi-Fi module for transmission of data. [1].Internet of Things for smart cities. A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi. It gave the idea of IoT subject and addition details about IoT. The proper smart environment and various applications.[2]Top-k Query based dynamic scheduling for IoT-enabled small city waste collection by Theodoros Anagnostopoulos, Arkady Zaslavsky, Alexey Medvedev, Sergei Khoruzhnicov. It gave us the concept of dynamic scheduling required for the cleaning of dustbin and the Top-k query led us to priority based cleaning of dustbins.[3]City Garbage collection indicator using RF(Zigbee) and Wi-Fi module. This paper gave the details for the module required for the transmission of the data to the receiver side and also the main channel follow of the project. Initially we used Wi-Fi module for our project but later on decided to us GSM Technology for the ease of data transmission.[4]Smart Garbage Management System by Vikrant Bhor, Pankaj Morajkar, Maheshwar Gurav, Dishant Pandya. It provided us with additional details and designs needed for flow and management of garbage while collection

## III Proposed System

Considering the need of modern technology the smart trash bin can expensive but considering the amount of dustbin needed in India, expensive trash bin would not be a prior experiment that is why we have decide to use based sensors to reduce its cost and also make it efficient in applications.

## IV System Architecture

**Microcontroller ARM (LPC2148)** The Arduino / Genuino Uno is a microcontroller board based on. The ATmega328P (datasheet).It has 14input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

**US Sensor ( HC-SR04 ):**

This Ultra Sonic Sensor gives indicates the level of garbage filled in dustbin and US Sensor are planted at top levels on the dustbin to show us the actual level of garbage in it.

**GSM Module:**

GSM Module (GSM 850/900 1800/1900) with AT command set and RS232 interface on CMOS level. This GSM wireless data module is the ready a solution for remote wireless applications, machine to machine or user to machine and remote data communications in all vertical market applications.

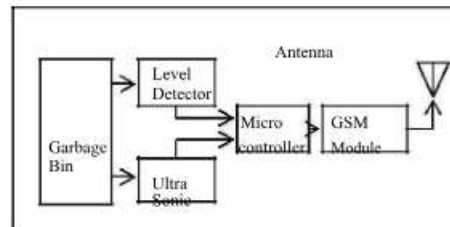


Fig. 1 Transmitter

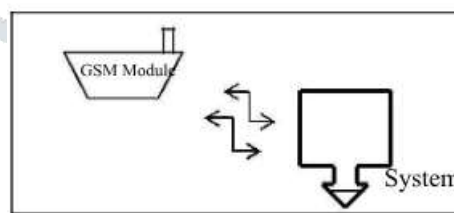


Fig. 2 Receiver

**V Test cases and Results:**

1. Dustbin when empty or half - 0% or 50 % ( It will detect continuously )
2. Dustbin full – 90% (when sensors gives output )
3. Dustbin is heavy- when threshold weight of dustbin is crossed ( Ultra Sonic sensor gives output )

**VI Conclusion:**

This project work is the implementation Smart Trash Can using US sensor, microcontroller and GSM module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record to sent to the higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the smart trash can management system makes the garbage collection more efficient. Such systems are vulnerable to plundering of components in the system in different ways which needs to be worked on.

**VII Future Enhancement:**

Smart dustbin helps us to reduce the pollution. Many times garbage dustbin is overflow and many animals like dog or rat enters inside or near the dustbin. This creates a bad scene. Also some birds are also trying to take out garbage from dustbin. This project can avoid such situations. And the message can be sent directly to the cleaning vehicle instead of the contractor's office

**VIII REFERENCES**

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