

# IOT Based Smart Garbage Management System using PIC Controller

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## Abstract

The idea is simple and is driven by the fact that dustbins require very frequent cleaning, which is not always possible. This leads to unhealthy environment and spread of diseases. The aim is to accommodate more and get the dustbin cleaned timely using alert services. The term waste management usually relates to all kinds of waste, whether generated during the extraction of raw materials, the processing of raw materials into final products, the consumption of final products, or other human activities, including municipal, agricultural, and social like health care etc. There needs to be system that gives prior information of the filling of the bin that alerts the municipality so that they can clean the bin on time and safeguard the environment [1]. To avoid all such situations we intend to propose a solution for this problem Smart Garbage Bin, which will inform the authorized person when the garbage bin is about to fill and will send the location of bin by using GSM.

**Keywords:** Global System for Mobile, Microcontroller, Ultrasonic sensor, Smart Bin

## I. INTRODUCTION

Due to rapid population growth, disorganization of city governments, a lack of public awareness and limited funding for programs, garbage management is becoming a global problem. Due to the lack of care and attention by the authorities the garbage bins are mostly seem to be overflowing. It has to be taken into care by corresponding authorities and should think what method can be followed to overcome this. This survey paper shows some effective solutions. 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. IoT can be used to provide a platform for smart garbage management. Some of the commonly used methods are implemented using sensors and microcontrollers. The details of each bins are monitored by the authority with the help of GUI. Effective actions will be taken if the corresponding authority is not concerned regarding the cleaning of bins. The implementation of smart garbage management system using sensors, microcontrollers and GSM module 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 is 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 ultimate helps to keep cleanness in the society. Smart collection bin works with the sensors will show us the various levels of garbage in the dustbins and also the weight sensor gets activated to send its output ahead when its threshold level is crossed. If dustbins are not cleaned in time, the details will be forwarded to higher authority. Different implementation methods are explained in the remaining parts.

## II. LITERATURE SURVEY

Before going into the details of our Iot based Smart Garbage Management system, we will review some of the existing system in vogue pertaining to Smart garbage System In the traditional Garbage Management, the Municipal Corporations are assigned to place big dustbins in the society for the collection of the garbage and waste. Once the bin gets filled, bin gets cleaned by the garbage collector and bin collected are disposed somewhere appropriate. This system got no proper supervision from the corporation for cleaning the bin regularly which creates dirtiness on the streets and roads and spread diseases. So accordingly some initiative has been proposed in developing IoT Technology for Garbage Management.

In one of the research [1], sensor (Ultrasonic sensor / temperature sensor) is placed under the dustbin. When the sensor signal reaches to the threshold value, a mail notification (like email, twitter, whatsapp message) will be sent to the respective Municipal / Government authority person. Density of the Dustbin also checked through a GUI (Graphical User Interface) so any of the authenticated people can check the present condition of the dustbin. This would enable the personnel to send the collection vehicle to collect the full garbage bin or dustbin.

In another research [2], the dustbins are interfaced with microcontroller based system having IR wireless systems along with central system showing current status of garbage, on mobile web browser with html page by Wi-Fi. Lastly research [3] also been carried out for multiple dustbins located throughout the city or the campus which are provided with low cost embedded device that helps in tracking the level of the garbage bins and an unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. These details can be accessed by the concerned authorities from their place with the help of Internet and an immediate action can be made to clean the dustbin

### III. PROPOSED SYSTEM

In “garbage management system” the level of garbage in dustbin is detected with the help of sensor system and communicates to the authorized control room. GSM and sensor uses pic as interface.

#### A. Advantages

- Prior information will give to the corporation to clean the dust bin.
- Can save the bin from rain and fire.
- Can avoid causing disease by open close system

### IV. SYSTEM LEVEL DESCRIPTION

#### A. Web Application:

The Web applications that are designed called “Waste Management” and is used on the client’s side as well as sever side. Vehicle driver can registered to server through web application, User can update his information when needed through Server.

#### B. GSM Module:

A GSM module is used to communicate with authorized person when the bin is about to fill. Communication is done via text message that contain bin ID and location address. Thus person can collect waste from informed address. GSM module can also be used for two way communication. It is used as a complaint number for people. If cleaning of waste bin is not properly done then people can raise the complaint on this number to municipal office.

#### C. PIC Micro Controller:

PIC refers to input and output interface controller. It is family of microcontroller formed by Microchip Company. It is more popular due to their low price, large availability, free development tools and reprogramming in flash memory. PIC microcontroller has fabulous features and they are good for a wide range of applications. It has enhanced Harvard architecture which is built by microchip technology. PIC microcontrollers are mostly used in the embedded based projects. It supports a low power consumption sleep mode. System uses 16F877A for implementation because it has low power consumption less than 2mA at 5V and 3mA, 18microA at 3V more efficient, less time consuming. It is flash microcontroller. It has 10 bit A to D convertor and two PWM modules. PIC16F877A is used as smart microcontroller which performs two main functions. It identifies operated data from batteries and Because of its high performance, low power consumption, more efficient, we are going to use PIC 16F877A microcontroller.



Fig. 1: PIC Micro Controller

#### D. Ultrasonic Sensor:

This is the HC-SR04 ultrasonic ranging sensor. This temperate sensor gives non-contact estimation usefulness with a going exactness that can reach up to 3mm. Each HC-SR04 module incorporates the ultrasonic transmitter, a recipient and a control circuit.

There are just four sticks that you have to stress over on the HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground). You will discover this sensor simple to set up. Operating Voltage: 5V, DC Operating Current: 15mA, Measure Angle: 15°.



Fig. 2: Ultrasonic Sensor

#### **E. FIRE, PIR & RAIN Sensor**

- 1) PIR sensor is used to find any animals fall inside the dust bin to eat the waste food in the dustbin. Then the Buzzer will ring. When hear the buzzer sound then the animal get fear and went off from the dustbin.
- 2) Rain sensor is used, when it rains then the dust bin will not open because the rain water fill the dustbin and the garbage start decay will cause lot of diseases in rainy seasons.
- 3) Fire sensor is used to find the fire in the dustbin If it gets fire then the intimation will send through the IOT modem.

#### **F. Power Supply:**

the board can operate in between 6-20 volts on an external the board become unstable the supply is unstable if supply is less than 7v or supply is greater than 12v it may overhead and damage the board.so 7-12v is recommended to use

### **V. APPLICATION**

- Lowers waste and recycling costs by reducing the number of times compactor(s) are emptied.
- Reducing the environmental hazards to the residents.
- Saving tax payers money to pay less on the garbage collection fees.
- New products such as advertisement on smart can may be included.
- Local event signage can be posted electronically.
- This can be best used by Municipal Corporation for their betterment of management regarding collection of wastes.
- With the help of proper technology (GSM & SOFTWARE APPLICATIONS) we can guide the trucks to choose the shortest path.
- It also favours the “SMART CITY” project and “DIGITAL INDIA”

### **VI. CONCLUSION**

After this survey we come to know that lot of work has been done in field of waste management and IOT based Smart collection. We get that Waste Management is implemented with various techniques also Waste management is done by using IoT techniques. To keep effectiveness of work IoT technique is used. There is a very little focus on control mechanisms on SWM which is adversely effecting on safety, health and the environment of smart city. We can extend this work which will work on the doing separation of waste into type- dry, wet, plastic etc with the help of robotic arms.

### **VII.FUTURE WORK**

Future Work for the proposed system as follows, In proposed model we connected single dustbin to cloud to get the data further we will connect the entire dustbin together. Data of dustbin can be checked in cloud database further we will design a web portal to connect the entire dustbin together. Further indication will be given to the user to move left or right side by when dustbin is full. Further all the dustbin full data will together sent to the authorities with a new algorithm. Further Reset button will be given to dustbin to work in manual mode when cleaners collect the garbage

## VIII. EXPERIMENTAL RESULT



Fig. 3:



Fig. 4:

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