

# IOT BASED SMART GARBAGE SYSTEM

Prof. Rajshri Nikam

Assistant Professor

Department of Information Technology,  
ABMSP's Anantrao Pawar College of Engineering & Research, Pune, India,

**Abstract:** Recently, it is seen that dustbins placed at various places like public places such as hospitals, educational Institutes, and Industries are overflowing. This overflowing of garbage bins creates an unhygienic condition which can spread the diseases. Also, the rapid increase in population waste gives rise to improper waste management. To avoid this situation, we proposed a new system Smart Waste Collection and Weight Measurement System Using IoT. In recent decades, Urbanization has increased tremendously. At the same time, there is an increase in waste production. Waste management has been a crucial issue to be considered. This paper is a way to achieve this good cause. In this paper, the smart bin is built on a micro controller-based platform Arduino Uno board which is interfaced with GSM modem and Ultrasonic sensor. And also, the weight Sensor which is used for calculating the weight of the dustbins. The Weight Sensor is placed at the Bottom of the dustbins which will measure the weight of the dustbins and also The Ultrasonic sensor is placed at the top of the dustbin which will measure the status of the dustbin. The threshold limit is set to 70% of total bin storage for collection of garbage. Arduino will be programmed in such a way that when the dust-bin is being filled, the remaining height from the threshold height will be displayed. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will continuously alert the required authority until the garbage in the dustbin is squashed. According to the location, the system will send the message to the respective worker; garbage vehicle can collect garbage.

**Index Terms** - Ultrasonic sensor, Weight Sensor, Arduino Garbage Collection, Smart bins, Internet of Things.

## I. INTRODUCTION

One of the main concerns with our environment has been solid waste management which in addition to disturbing the balance of the environment also has adverse effects on the health of the society. Considering the need of modern technology, the smart garbage bin can expensive but considering the amount of dustbin needed in India, expensive garbage bin would not be a prior experiment that is why we have decided to use based sensors to reduce its cost and also make it efficient in applications. This project work is the implementation of a smart garbage management system using Ultrasonic/Weight sensor, microcontroller, and Communication 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 is sent to the admin who can take appropriate action against the concerned collector. 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 society. Therefore, the intelligent garbage management system makes the garbage collection more efficient. Such systems are vulnerable to the plundering of components in the system in different ways which need to be worked on.

Nowadays, almost nothing can be achieved or fulfilled without the use of computers. The world is drenched in the internet and the trend internet of things is also gaining a lot of attention. The Internet of Things (IoT) is a phrase that was first used in 1999 by Kevin Ashton while he was working at MIT's Media Centre. He meant it to represent the concept of computers and machines with sensors, which connect to the Internet to report status and accept control commands. The IoT, in reality, has been around for a long time, but it didn't have a name. Machine-to-machine (M2M) communications have been in existence for many decades, often using dedicated networks that eventually converged over to the Internet. It enables the feature as everything to everything connectivity to enhance the vision of the smart world. IoT is a network of sensors where data is exchanged, using different connectivity protocols, with systems. This set up can be leveraged to create a new business application or to enhance an existing process. The exchange of the data can be bi-directional between sensors and systems. IoT infrastructures present several common characteristics, such as:

- Dealing with heterogeneity.
- Use of resource-constrained devices.
- Applications that require spontaneous interaction.
- Ultra-large-scale networks and a large number of events.
- Dynamic network behavior requirements.
- Context-aware and location-aware applications.
- The need for distributed intelligence.

Two important issues in distributed applications are the use of low-cost hardware platforms and the management of the available resources at the nodes, typically processor, memory, network usage and energy (Power) usage.

## 2. LITERATURE SURVEY

Load cell sensor used to measure the maximum load of weight [1] and Arduino has many pins that give us a place of data processing and power. The other function of this module is an analog, digital converter pin which is used to process data that will be sent by Arduino to the web server. we will put a sensor on top of the garbage bin which will detect the total level of garbage inside it according to the total size of the bin.

Ultra-sonic sensor, [3] One of the advantages of ultrasonic sensing is its outstanding capability to probe inside objectives non-destructively as ultrasound can propagate through any kinds of media including solids, liquids, and gases except vacuum. In typical ultrasonic sensing, the ultrasonic waves are traveling in a medium and often focused on evaluating objects.

The level of garbage in the dustbins is detected with the help of Sensors, and communicate with authorized admin room through a GSM system [4].

When the garbage will reach the maximum level, [2] a notification will be sent to the corporation's office, then the employees can take further actions to empty the bin. By using this system people do not have to check all the systems manually but they will get a notification when the bin will get filled.

## II. PROBLEM STATEMENT

The existing garbage monitoring method is based on a Garbage weight data of vehicle as well as Garbage Boxes which causes incorrect data and create the problem in future for any municipal corporation. In the proposed work to design an architecture which works on optimization algorithms for Smart City management and more specifically this system deals with municipal waste collection procedure. Consider existing IoT infrastructure and sensor networks for proposed execution. We need to achieve all the parameters using the IoT environment.

## III. PROPOSED SYSTEM

Figure shows the system architecture, there are many garbage bins in many areas, and in each bin load cell sensor and ultra-sonic sensor will be situated. We gave around 4 to 5 parameters of every bins as chromosomes like Bin id, location, level, current garbage weight value etc.

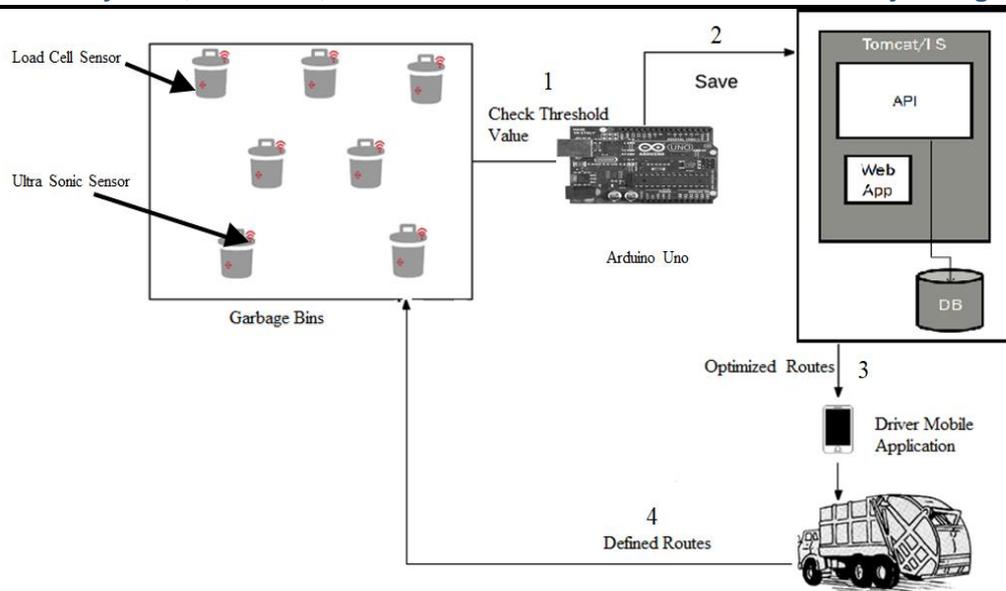


Fig.1: System Architecture

Where load cell sensor will check the weight of garbage and ultra-sonic sensor will check the level of garbage. And the data of sensors will be sent to Arduino Uno port. Arduino Uno will consist of GSM module, and it will check threshold value which is set to 70% and with the help of GSM module the data of Arduino Uno will be send to system. The system will consist of IIS server including API, web application and also database. Web application will be handled by admin, where admin can monitor and track the vehicles etc. System will cluster the garbage bins data from many different areas and save each data of whole process in database. System will also be optimized routes and will set routes with the help of GPS (Global Positioning System), system will give this data to Mobile application of Driver. Driver will follow the instructions given in the Mobile application, like defined routes set by the System. And after collecting garbage of each bins the data will be automatically update and save in database which admin can monitor any time.

#### OTHER SPECIFICATIONS

##### 1. Advantages

- Real time information on the fill level of the dustbin.
- Current vehicle tracking and garbage weight monitoring.
- Cost Reduction and resource optimization.

#### IV. CONCLUSION

Monitoring the levels of bins during the utilization of sensors, it is probable to obtain a more efficient system than the current existing. Our plan of Smart waste administration system mostly concentrates on monitoring the waste administration, given a smart technology used for the waste system, avoiding human interference, tumbling human time as well as effort also which outcome in healthy and waste-ridden surroundings.

The proposed method for the monitoring of garbage is an efficient and time-saving process. This system can be implemented at any place with ease and within reasonable amount of time. The method would not only function for collecting and updating data automatically and timely but also it could analyze and use data intelligently.

The system gives the review on public waste collection administration methods also showed the examples of solutions introduced by the current study in this region. This answer is based on the idea of IoT infrastructure, which should provide enough information to handle this Smart City issue more efficiently.

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