

# IoT Based Garbage Monitoring System

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**Abstract**— Now a day we are going to make our city to be smart and clean. Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as malformation to that place leaving bad smell. To avoid all such situations we are going to implement a project called IoT Based Garbage Monitoring System. This project contain four dustbins. These dustbins are interfaced with PIC16F73 microcontroller based system having Ultrasonic Sensor wireless systems along with central system showing current status of garbage, on mobile web browser by Wi-Fi. Hence the status will be updated on the web browser page. Major part of our project depends upon the working of the Wi-Fi module; essential for its implementation. The main motive of this project is to reduce human resources, environmental pollution and efforts along with the enhancement of a smart city vision. This project also promote to Swachh Bharat Abhiyan.

**Key words:** Monitoring System, IoT

## I. INTRODUCTION

The term Internet of Things was coined by industry researchers but has emerged into mainstream public view only more recently. Some claim the Internet of Things will completely transform how computer networks are used for the next 10 or 100 years, while others believe IoT is simply hype that won't much impact the daily lives of most people. 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 combination of sensors namely weight sensor and Ultrasonic sensor that indicates its different levels respectively. The Ultrasonic sensors will show us the various levels of garbage in the dustbins to send its output ahead when its threshold level is crossed. This details are further given of the microcontroller (PIC16F73) and the controller gives the details to the transmitter module (Wi-Fi module). At the receiver section a mobile handset is needed to be connected to the Wi-Fi router so the details of the garbage bin is displayed onto the HTTP page in web browser of our mobile handset.

## 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 Ultrasonic sensor and Wi-Fi module for transmission of data. . The technologies used at disposal to develop this smart system have also evolved, i.e. from WSNs to RFIDs to now the most popular Internet of Things. Each idea seems to be similar but is slightly different at its core and our proposed work is no exception from the same. After the IoT field, finding its hold in our lives, this is our original plan for designing a smart garbage collection system which has provision for citizen participation and analysis of data for better decision making. At hardware level, the smart system is a garbage bin with ultrasonic sensor, a PIC microcontroller and Wi-Fi module for transmission of data.

## III. SYSTEM ARCHITECTURE

### A. PIC16F73 microcontroller

PIC16F73 devices are available only in 28-pin packages. The PIC16F73 have only 35 single word instructions to learn. Operating speed of PIC16F7E microcontroller in DC-20 MHz clock input and DC - 200 ns instruction cycle. It consumed Low power and high speed CMOS FLASH technology. It's wide operating voltage range: 2.0V to 5.5V and High Sink/Source Current is 25 ma.

### B. HC-SR04 Ultrasonic Module

Provide TRIGGER signal, at least 10µS High Level (5V) pulse. The module will automatically transmit eight 40KHz ultrasonic burst. If there is an obstacle in-front of the module, it will reflect the ultrasonic burst.If the signal is back, ECHO output of the sensor will be in HIGH state (5V) for a duration of time taken for sending and receiving ultrasonic burst. Pulse width ranges from about 150µS to

25ms and if no obstacle is detected, the echo pulse width will be about 38ms.

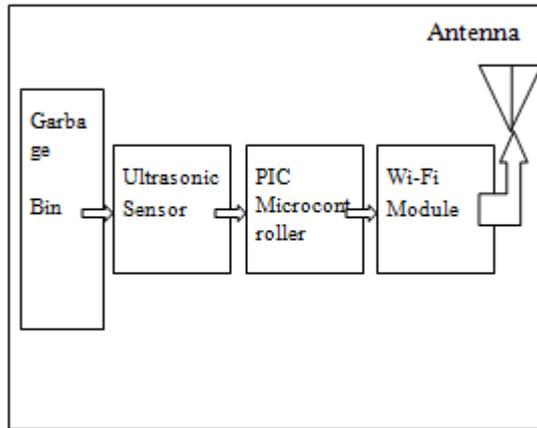


Fig. 1: Transmitter

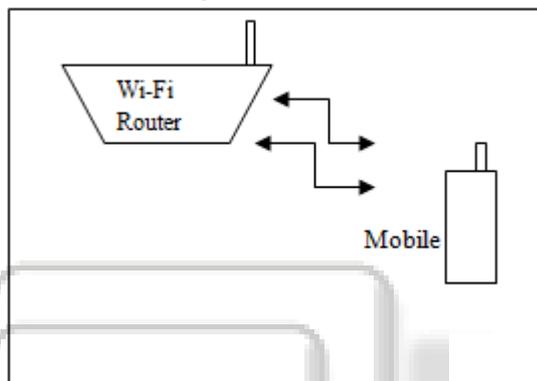


Fig. 2: Receiver

### C. Wi-Fi Module

Wi-Fi or Wi-Fi is a technology for wireless local area networking with devices based on the IEEE 802.11 standards. 802.11 is the "radio frequency" needed to transmit Wi-Fi. It was defined by Vic Hayes who created the IEEE 802.11 committee. Wi-Fi is a trademark of the Wi-Fi Alliance, which restricts the use of the term Wi-Fi Certified to product that successfully complete interoperability certification testing.

## IV. 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. This project is also support to make smart city. User connivance has been enhanced with advent of IOT.

## V. CONCLUSION

This project work is the implementation of smart garbage management system using Ultrasonic sensor, PIC microcontroller and Wi-Fi 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 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 garbage 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.

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