

# INTELLIGENT DISPOSAL OF GARBAGE USING IoT

**P.SWETHA**

Department of computer science and engineering  
Sri Sai Ram engineering college  
Chennai, India  
[swethaprabakar97@gmail.com](mailto:swethaprabakar97@gmail.com)

**M.AKSHAYA**

Department of computer science and engineering  
Sri Sai Ram engineering college  
Chennai, India  
[akshayabhu8996@gmail.com](mailto:akshayabhu8996@gmail.com)

**Abstract**— 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 ugliness to that place leaving unpleasant smell. To avoid all such situations we are going to implement a project called IoT Based Intelligent disposal of garbage. In this project dustbins are interfaced with microcontroller based system having Ultrasonic sensor and IR sensor along with central system showing current status of garbage, on mobile web browser with html page by Wi-Fi.

This system also contains gas sensor within it to avoid leakage of toxic gases from the container. Hence the status will be updated on to the html page. And the information detected could be dynamically sent to all the stakeholders involved in the system and it leads to the optimized collection routes of garbage bin. Here the admirable feature present is that we planned to provide free Wi-Fi for a person who is dumping the waste into the garbage bin by transferring Wi-Fi code. It will be utilized by a person within the particular distance from the garbage bin. Major part of our project depends upon the working of the Wi-Fi module, essential for its implementation. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision.

## INTRODUCTION

Internet and its uses have become an important 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 human and computer-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 ultrasonic sensor and IR sensor that indicates its weight at different levels respectively. The IR sensors will show us the various levels of garbage in the dustbins and also the ultrasonic sensor gets activated to send its output ahead when its threshold level is crossed. This details are further given of the microcontroller (PIC) 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 HTML page in web browser of our mobile handset and also the important feature present in this intelligent smart disposal of garbage is to provide a 10 minutes free Wi-Fi for the person who is dumping the waste into the garbage bin by transferring Wi-Fi code between the user and the garbage bin.

## 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, IR sensor, gas sensor and Wi-Fi module for transmission of data.

[1]. A State of the Art review on Internet of Things by P. Suresh, Vijay. Daniel, R.H. Aswathy, Dr. V. Parthasarathy. It gave the idea of IoT subject and addition details about IoT. The proper smart environment and various applications.

[2].Internet of Things: Challenges and state-of-the-art solutions in Internet-scale Sensor Information Management and Mobile analytics by Arkady Zaslavsky, Dimitrios

Georgakopoulos. This paper gave us the details about mobile analysis and sensor information management that will help in data segregation of various dustbins.

[3]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

[4]City Garbage collection indicator using RF(Zigbee) and GSM technology. 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 GSM technology for our project but later on decided to use Wi-Fi module for the ease of data transmission.

[5]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

[6]IoT-Based Smart Garbage System for efficient food waste management by Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, Sehyun Park. This paper gave the overview working of the IoT based smart garbage bin and the food management.

[7] IoT Based Smart Garbage and Waste Collection Bin S.S.Navghane<sup>1</sup>, M.S.Killedar<sup>2</sup>, Dr.V.M.Rohokale<sup>3</sup>. 1, 2: SKN-SITS, Dept. of E&TC, Lonavala 3: Asst. Professor, SKN-SITS, Lonavala

**PROPOSED SYSTEM**

Considering the need of modern technology the smart garbage bin can be 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. The sensors used could be very cheaper in cost and the information collected can also be sent to all the stakeholders of the system.

**SYSTEM ARCHITECTURE**

**Microcontroller(PIC16F87XA)**

The PIC16F87XA microcontrollers are based on a 32/16 bit ARM7TDMI-S™ CPU. With real-time emulation and embedded trace support, that combines the microcontroller With 32 kB, 64 kB and 512 kB of embedded high speed Flash memory and also with many features comprising of with it.

**IR Sensor (TSOP 1738)**

This IR Sensor gives indicates the level of garbage filled in dustbin and IR Sensor are planted at three different levels on the surface of dustbin to show us the actual level of garbage present in it.

**Ultrasonic Sensor**

The ultrasonic sensor is used for detection of amount of garbage in dustbin. It works on the principle of finding the latitude and longitude of the dust bin.

**Wi-Fi Module**

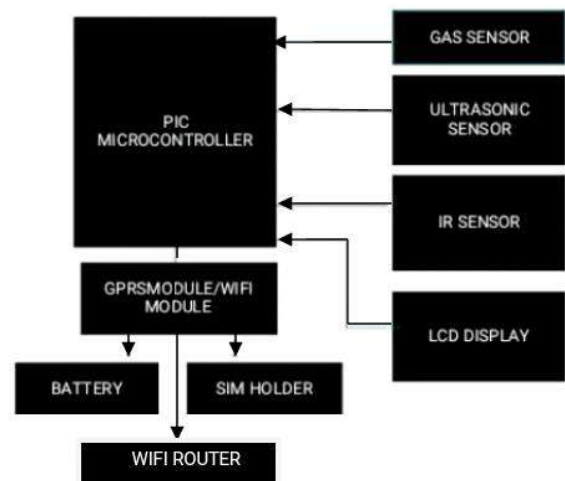
802.11b/g/n protocol, Wi-Fi Direct (P2P),soft-AP, Integrated TCP/IP protocol stack. Wi-Fi Module helps us to send the details of the dustbin at the receiver side.

**Gas sensor**

It is used to detect the leakage of gases and if any chemical reaction takes place inside it can be used to detect the gas level and also used to maintain the level of radioactive substances.

**GPRS module**

It contains the SIM holder and battery inside it, where the SIM can be inserted into the SIM CARD holder, and the battery can be used to operate the device.



**TEST CASES AND RESULTS**

- 1) Dustbin when empty - 0% (when 1st level IR Sensor gives output )
- 2) Dustbin half – 50% (when 1st level and 2nd level IR Sensor gives output )
- 3) Dustbin full – 90% (when all three level sensors gives output )
- 4) Dustbin is heavy- when threshold weight of dustbin is crossed the ultrasonic sensor sends the message(weight sensor gives output )

Where the gas level can also be detected and it be enclosed with the level of the dustbin. Then the message can be sent to the overall stakeholders of the system.

## CONCLUSION

This idea is the implementation of intelligent garbage disposal system using IR and ultrasonic sensor, in combination with PIC microcontroller and Wi-Fi module. This implementation provides a cleaning of waste container soon when trash can level reach its maximum threshold value. If the trashcan is not cleaned between the specific range of time given, then the data gathered is sent to the stakeholders who can take appropriate action against the concerned person. This intelligent smart disposal of waste is used to keep track of the fake reports and to decrease the rate of corruption in the management system. It gives the optimized way of garbage collection and hence decreases the heavy routes of garbage collection stated in the traditional way. It helps to keep neatness in the environment to make our society disease free with a clean surrounding.

## FUTURE ENHANCEMENT

Intelligent dustbins help us to decrease the rate of the pollution. Most of the times waste trashcan is fulfilled and number of animals will gather close to the garbage bin. That provides an unhealthy scene of environment. Many times birds can also try to enter into the garbage bin. This intelligent disposal of waste using IoT system can eliminate this kind of actions. And the data can be sent directly to the garbage collector and also to the other stakeholders.

## ACKNOWLEDGMENT

We are thankful to the constant support from my Head of Department Dr. Latha. Her motivations made my work simple and confident.

We would like to thank my guide Dr. Manimala for her constant support, motivation, good suggestions for completing this project.

## REFERENCES

[1] P. Suresh1, J. Vijay Daniel2, Dr. V. Parthasarathy4 "A state of the art review on the Internet of Things (IoT)" International Conference on Science, Engineering and Management Research (ICSEMR 2014)

[2] Arkady Zaslavsky, Dimitrios Georgakopoulos "Internet of Things: Challenges and State-of-the-art solutions in Internet-scale Sensor Information Management and Mobile Analytics" 2015 16th IEEE International Conference on Mobile Data Management

[3] Theodoros. Anagnostopoulos1, Arkady. Zaslavsky 2,1, Alexey Medvedev1, Sergei Khoruzhnicov1 "Top-k Query based Dynamic Scheduling for IoT enabled Smart City Waste Collection" 2015 16th IEEE International Conference on Mobile Data Management.

[4] "City Garbage collection indicator using RF (Zigbee) and GSM technology"

[5] Vikrant Bhor, Pankaj Morajkar, Maheshwar Gurav, Dishant Pandya4 "Smart Garbage Management System" International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV4IS031175 Vol. 4 Issue 03, March-2015

[6] Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, and Sehyun Park, "IoT-Based Smart Garbage System for Efficient Food Waste Management", The Scientific World Journal Volume 2014 (2014), Article ID 646953

[7] Marian Look, "Trash Plant: India", earth911B.

[8] Basic Feature, "Solid waste Management Project by MCGM

[9] IoT Based Smart Garbage and Waste Collection Bin S.S.Navghane1, M.S.Killedar2, Dr.V.M.Rohokale3. 1, 2: SKN-SITS, Dept. of E&TC, Lonavala 3: Asst. Professor, SKN-SITS, Lonavala