# Automatic Monitoring and Controlling System for Waste Management Using IOT

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## ABSTRACT

The major problems affecting solid waste management are unscientific treatment, improper collection of wastes and ethical problems. This is in turn leads to hazards like environmental degradation, water pollution, soil pollution, and air pollution. Annually the country is generating solid waste of around 100MT (Million Tons). The problems of waste generation and management has become a serious issue of concern to many scholars in environmental studies. This paper critically examine the attitude of urban dwellers to waste disposal and management. One hundred and fifty copies of questionnaire were administered to residents in the area. Information such as the various classes of waste, frequency of waste disposal and methods of waste evacuation were obtained from the questionnaire. Finding revealed that family size has a great influence on waste disposal and generation which was evidence in the hypothesis with a calculated value of 7.32 greater than the critical value of 2.43 at 0.05 level of significance. Besides, environmental enlightenment has changed people's attitude towards waste generation and management in the area. This was affirmed in the calculated f-value of 3.18 greater than critical t-value of 1.97 at 0.05 level of significance. However, this result indicate that effective environmental enlightenment would help avert the attitude of urban dwellers to waste disposal and management in the area. So, to avoid this we can implement "Automatic Monitoring and controlling system for Waste Management using IOT". Disposing the Waste like wet, dry or biodegradable and non-biodegradable which are getting dumped together are being the big deal in India right now. There were large amount of plastics and other wastes were produced every year which are not currently carried out in any recycling plants. In order to provide solution for these wastes we have done a project "IOT based smart waste management system". This will endure the greenish environment and support the swatch bharat for cleanliness.

Keywords— IoT, Waste management, Sensor

## I. INTRODUCTION

To make the cities greener, safer, and more efficient, Internet of Things (IoT) plays an important role. A smart city is nothing but a vision to integrate several information and communication technology along with IoT in a way so as to manage a city's assets. The city's assets include, among others, the local departments, information systems, libraries, schools, hospitals, waste management systems, transportation

systems etc. We present a waste collection management solution based on providing intelligence to waste bins, using an IoT prototype with sensors.

The term Internet of Things (often abbreviated IoT) was coined by industry researchers but has emerged into mainstream public view only more recently. IoT is a network of physical devices, including things like smart phones, vehicles, home appliances, and more, that connects to and exchange data with computers.

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.

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## II. EXISTING SYSTEM

Recently, human kind in large cities is suffered from serious health problem due to large amount of waste accumulation result from the activities in populated cites. There for a real-time waste management system is indispensable for monitoring and controlling accumulation of waste. Ultrasonic sensors are used to sense the waste level of monitored container for tracking the status of the waste containers. The sensed data is transmitted to Arduino UNO board using ZigBee module [1] that control the transmission Using ESP-Wi-Fi module to the web site through the TCP/IP protocol. The web site displays the state of

waste level in the containers. The displayed status shows either container get full or not, which helps for taking action to dispose the waste through sending SMS to the garbage truck. Wired and wireless networks are used for connecting the surrounding without the user intervention is called Internet of Things (IoT). Information is exchanged between the objects. The level of water is measured using ultrasonic sensor inside a tank. It consists of transmitter and receiver. High frequency waves are emitted from the transmitter and it is received by the receiver. The ultrasonic sensor is controlled by the 32-bit microcontroller. Garbage collection system that is automatic having information collection system based on the processing of images taken and GSM module. The garbage bins indicate the garbage level is monitored by the module via a web page to the user. The webpage highlights the collected garbage in a particular color and gives a graphical view of the bin. System that identifies when a litter bin is completely full. In this system, data is collected and transmitted via a wireless mesh network. Moreover, to reduce the amount of power maximize the time efficiency of the operations, the system employs duty cycle technique. IoT plays a vast role in making the city greener, safer, and more efficient. Identification and collection of wastes in a garbage bin. Garbage containers transmit signals to the appropriate authority indicating that it is over 80% or 90% full and requires to be emptied. Once the garbage bin is full, a signal or notification is then sent via a mobile communication network to a web-based presentation used by the unwanted controlling authorities and the garbage collecting vehicle. Simply, the wastages are separated by Human employee so that more number of human resources is required for waste management.

The public recycling bins. The existing bins consists of the sensing units, Bluetooth, mobile application and LoRa communication are used for data transmission and communication purpose. Ultrasonic sensors and gas sensors are used just to indicate the

level of the garbage in the dust bin and sense the odour around the dustbin.

### III. PROPOSED SYSTEM

In this proposed system we are using suitable sensors and Arduino UNO, Wi-Fi module and internet of things. This is system is developed importantly to separate the metal and dry waste using DC motor. Using the Ultrasonic sensor, garbage level will have maintained. If the garbage filled, through GPS the location information will get to the Municipality Board. Finally, the received information gets monitored in the WebPages.
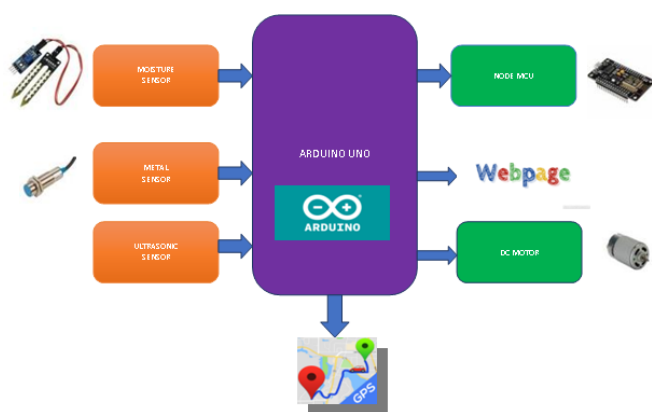


To make the cities greener, safer, and more efficient, Internet of Things (IoT) plays an important role. Disposing the Waste like wet, dry or biodegradable and non-biodegradable which are getting dumped together are being the big deal in India right now. There were large amount of plastics and other wastes were produced every year which are not currently carried out in any recycling plants. In order to provide solution for these wastes we have done a project "IOT based smart waste management system". This will endure the greenish environment and support the swatch bharat for cleanliness.

### IV. PROPOSED DESIGN

The basic concept of smart waste management system in cities is to handle the waste from initial to the disposal. The design is as follows:

### A. ARDUINO MICROCONTROLLER

A micro-controller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/ output peripherals The important part for us is that a  micro-controller contains the processor (which all computers have) and memory, and some input/output pins that you can control.
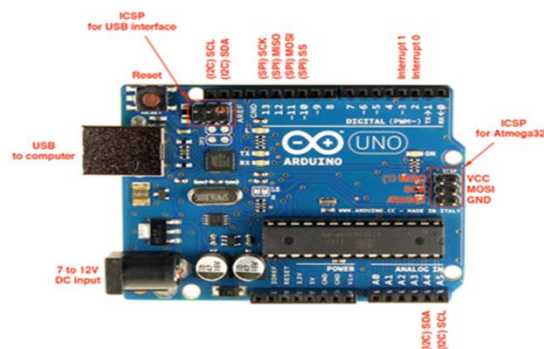


often called GPIO – General Purpose Input Output Pins).We will be using the Arduino Uno board. This combines a micro-controller along with all of the extras to make it easy for you to build and debug your projects. The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output 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. It contains everything needed to support the microcontroller.

### B. ULTRASONIC SENSOR:

It calculates the distance from the waste to itself i.e. sensor by sending sound waves and calculating the time required the wave to travel from transmitting till it bounces back.

## C. SOILMOISTURE SENSOR:

It measures the moisture in the waste collected and separate it on the basis of moisture level in it.

## D. METAL DETECTOR:

Metal Detector is a device which is used to detect a metal object that is not visible to our naked eye. It consists of an oscillator which produces an alternating current that passes through coil producing alternating magnetic field. The first industrial metal detectors were developed in 1960s widely used for mining and other industrial purposes.

## V. CONCLUSION

This paper shows how the smart waste management using IoT can be implemented. This proposed system assures the collection of garbage soon when the garbage level reaches its maximum level. The system will thus provide accurate reports, increasing the efficiency of the system. The real-time monitoring of the garbage level with the help of sensors and wireless communication will reduce the total number of trips required of GCV and thus, will reduce the total expenditure associated with the garbage collection. Thus, the dustbins will be cleared as and when filled, giving way to cleaner city, better infrastructure and increased hygiene.

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