

## **LITERATURE REVIEW**

### **Smart Waste Management System for Metropolitan Cities**

#### **PAPER 1:**

**TITLE:** IoT Based Waste Management for Smart City

**AUTHOR NAME:** Parkash Tambare, Prabu Venkatachalam

**PUBLICATION YEAR:**2016

#### **DESCRIPTION:**

In the present day scenario, many times we see that the garbage bins or Dust bin are placed at public places in the cities are overflowing due to increase in the waste every day. It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness, to avoid such a situation we are planning to design “IoT Based Waste Management for Smart Cities”. In this proposed System there are multiple dustbins located throughout the city or the Campus, these dustbins are provided with low cost embedded device which helps in tracking the level of the garbage bins and a 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 dustbins.

#### **PAPER 2:**

**TITLE:** Arduino Microcontroller Based Smart Dustbins for Smart Cities

**AUTHOR NAME:** K. Suresh, S. Bhuvanesh and B. Krishna Devan

**PUBLICATION YEAR:**2019

#### **DESCRIPTION:**

In this paper, a method is presented to make our surrounding's and environment to be clean. Recently the Government of India has launched a smart city project and for these smart

cities to be smarter, it is necessary that the garbage collection and disposal system has to be smarter than the existing systems. The idea of Self-Monitoring Automated Route Trash (SMART) dustbin is for the smart buildings, Colleges, Hospitals and bus stands, etc. In this paper, we have used the Ultrasonic sensor and PIR sensor to sense the human presence, Servomotor to open the dustbin top, Ultrasonic sensor to sense the garbage level. A communication module is used to communicate signals between two dustbins and GSM module to send the message to operator. As soon as the dustbin is full it moves in the predefined path to reach the unnoticed place with the help of the Line follower robot using Arduino Microcontroller. We have designed a simple model to test the effectiveness of the proposed method. This paper gives an idea to be implemented in Swach Bharat dustbin in a real time model of various loads like full load, half load and empty load and for different weights.

### **PAPER 3:**

**TITLE:** Waste Management Initiatives in India For Human Wellbeing

**AUTHOR NAME:** Dr. Raveesh Agarwal, Mona Chaudhary and Jayveer Singh

**PUBLICATION YEAR:**2015

### **DESCRIPTION:**

The objectives of writing this paper is to study the current practices related to the various waste management initiatives taken in India for humans wellbeing. The other purpose is to provide some suggestions and recommendations to improve the waste management practices in Indian towns. This paper is based on secondary research. Existing reports related to waste management and recommendations of planners/NGOs/consultants/government accountability agencies/key industry experts/ for improving the system are studied. It offers deep knowledge about the various waste management initiatives in India and find out the scope for improvement in the management of waste for the welfare of the society. The paper attempts to understand the important role played by the formal sector engaged in waste management in our country. This work is original and could be further extended.

**PAPER 4:**

**TITLE:** Design and Development of Smart Waste Management System: A Mobile App for Connecting and Monitoring Dustbin Using IoT

**AUTHOR NAME:** Na Jong Shen, Azham Hussain and Yuhanis Yusof

**PUBLICATION YEAR:** 2020

**DESCRIPTION:**

The Smart Waste Management System is a very innovative system which will contribute to the path towards Smart City. In our city, we usually observe that the trash bins put at open spots are always over-burden. It forms unsanitary conditions to the city and it is not optimize to solve the problem by currently existing waste management in Malaysia. Also, the traditional way of manually monitoring the wastes in dustbins is a complicated process and excessive more human effort with expenses. To avoid all such situations, a project called Smart Waste Management System is implemented. This system is developed to perform the connectivity of mobile application with Internet of Things (IoT) based dustbins. These dustbins are developed using IoT. IoT is the system of physical devices implanted with software, sensors and network connectivity which empowers these items to gather and trade information. The status of dustbins will be determined using ultrasonic sensor and collected data send through network to the database. The mobile application is used to monitor dustbins and perform route direction to the dustbins. The methodology which applies in developing this project is Adaptive Software Development (ASD). The benefits of this scheme are to reduce used of human resources and efforts together with the enhancement of Smart City. The prototype of this project is evaluated by some users before published to ensure the system can be enhanced in future works.

**PAPER 5:**

**TITLE:** IoT based smart garbage collection system

**AUTHOR NAME:** Rahul Kumar Borah, Sahana Shetty, Rahul Patidar, Anisha Raniwala and Kratee Jain

**PUBLICATION YEAR:** 2018

**DESCRIPTION:**

The smart waste bin is essential to develop a successful and dynamic waste management system. Waste management from its beginning to its transfer is one of the vital difficulties for the municipal corporations in everywhere throughout the world. Dustbins set across finished urban regions set at open spots are flooding a direct result of expansion to the waste each day and making unhygienic conditions for the occupants. To keep up an essential partition from such a circumstance we have proposed remote strong waste management prototype for sharp urban groups, which empowers common associations to screen the status of dustbins remotely, completed web server and keep urban groups clean profitably by enhancing cost and time required for it. At the point when dustbin has accomplished its greatest edge level, waste management division gets alert by methods for SMS through GSM module set at dustbin so the workplace can send garbage collection vehicle to the specific area to gather the refuse. The objective of the undertaking is to enhance sensibility of IoT based strong waste collection and administration system for the smart city.

**PAPER 6:**

**TITLE:** IoT-Enabled Solid Waste Management in Smart Cities

**AUTHOR NAME:** S.Vishnu, S.R.Jino Ramson, Samson Senith, Adnan M. Abu-Mahfouz, S.Srinivasan, Theodoros Anagnostopoulos, Xiaozhe Fan and A. Alfred Kirubaraj

**PUBLICATION YEAR:** 2021

**DESCRIPTION:**

The Internet of Things (IoT) paradigm plays a vital role for improving smart city applications by tracking and managing city processes in real-time. One of the most significant issues associated with smart city applications is solid waste management, which has a negative impact on our society's health and the environment. The traditional waste management process begins with waste created by city residents and disposed of in garbage bins at the source. Municipal department trucks collect garbage and move it to recycling centers on a fixed schedule. Municipalities and waste management companies fail to keep up with outdoor containers, making it impossible to determine when to clean them or when they are full. This work proposes an IoT-enabled solid waste management system for smart cities to overcome the limitations of the traditional waste management systems. The proposed architecture

consists of two types of end sensor nodes: PBLMU (Public Bin Level Monitoring Unit) and HBLMU (Home Bin Level Monitoring Unit), which are used to track bins in public and residential areas, respectively. The PBLMUs and HBLMUs measure the unfilled level of the trash bin and its location data, process it, and transmit it to a central monitoring station for storage and analysis. An intelligent Graphical User Interface (GUI) enables the waste collection authority to view and evaluate the unfilled status of each trash bin.

## **PAPER 7:**

**TITLE:** Smart City Waste Management System using IoT and Cloud Computing.

**AUTHOR NAME:** Aderemi A. Atayero, Segun I. Popoola, Rotimi Williams, Joke A. Badejo and Sanjay Misra

**PUBLICATION YEAR:** 2021

### **DESCRIPTION:**

Indiscriminate disposal of solid waste is a major issue in urban centers of most developing countries and it poses a serious threat to healthy living of the citizens. Access to reliable data on the state of solid waste at different locations within the city will help both the local authorities and the citizens to effectively manage the menace. In this paper, an intelligent solid waste monitoring system is developed using Internet of Things (IoT) and cloud computing technologies. The fill level of solid waste in each of the containers, which are strategically situated across the communities, is detected using ultrasonic sensors. A Wireless Fidelity (Wi-Fi) communication link is used to transmit the sensor data to an IoT cloud platform known as Thing Speak. Depending on the fill level, the system sends appropriate notification message (in form of tweet) to alert relevant authorities and concerned citizen(s) for necessary action. Also, the fill level is monitored on ThingSpeak in real-time. The system performance shows that the proposed solution may be found useful for efficient waste management in smart and connected communities.