Smart Waste Management System For Metropolitan Cities

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LITERATURE SURVEY

1.Title: Smart waste management using Internet of Things: A survey.

Author: K. N. Fallavi, V. R. Kumar and B. M. Chaithra.

Published In: [2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC)](#).

Description: At present solid waste management is a major concern in the metropolitan cities of the developing and developed countries. As the population is growing, the garbage is also increasing. This huge unmanaged accumulation of garbage is polluting the environment, spoiling the beauty of the area and also leading to the health hazard. In this era of Internet, IOT (Internet of Things) can be used effectively to manage this solid waste. In this paper, we have discussed the definition of Internet of Things and its elements, testing and prototyping tool cooja simulator and finally the study of various literatures available on smart waste management system using IOT.

2.Title: Smart Waste Collection Monitoring System using IoT.

Author: S. Pargaien, A. V. Pargaien, D. Verma, V. Sah, N. Pandey and N.Tripathi.

Description: Timely cleaning of dustbin is a big challenge and if left unaddressed, it may pose several health risks by making the place unhygienic. Current system for the waste management in local areas of small and highly populated cities is sluggish which leads to a lot of garbage strewn all over the city. The rate of generation of waste is so high that if the garbage collector doesn't visit a place for a couple of days it creates the conditions adverse. In covid-19 pandemic situation, it was very important to monitor and decompose medical waste properly. The handling of normal home garbage was also challenging due to lockdown. In this situation automatic monitoring and controlling of garbage using IOT can play a significance role in garbage management. This paper proposes a smart and fast approach for waste management by creating a network of smart dustbins equipped with sensors and microcontrollers in a city which is monitored by a central control unit to speed up the process in an intelligent and smart way thereby eliminating such hazardous conditions caused by the current sluggish system. The proposed system also takes into account the issue of improper internet connectivity.

3.Title: Smart Waste Management System for Crowded area : Makkah and Holy Sites as a Model.

Author: R. Elhassan, M. A. Ahmed and R. AbdAlhalem.

Published In: [2019 4th MEC International Conference on Big Data and Smart City (ICBDSC)](#).

Description: In implementing the smart cities the great challenge is how to manage waste with low cost and high performance. Waste has a negative impact in the society quality which smart city aims to improve it. Makkah and holy sites [Mona, Arafat, and Muzdalifah] are very congested areas where waste management is a big challenge. Three factors make it a big challenge, behind its natural, small area, short period of time and the increasing of the Pilgrimages' member. The process of collected wastes, separated it, and transports the containers daily and quickly to avoid any prospect of a spread of diseases is a complex process. This paper aims to study the concept of the waste management and proposed smart systems for waste management system with recycling .The proposed system will use the sensors technique insite the container, as a lower level, to separate the waste into 4 categories [food, plastics, papers, and metal] and use actuator at a top level to inform the management system to collect the container. The proposed system will save time, money and efforts compared to the recent process of the waste management system and improve the society quality as all.

4.Title: Garbage Collection System using IoT for Smart City.

Author: M. Badve, A. Chaudhari, P. Davda, V. Bagaria and D. Kalbande.

Description: In today's world, one of the major environmental problems is the collection, management and disposal of the garbage. The current process of garbage collection does not consider real-time garbage level in dustbins while generating routes for garbage trucks. Collecting garbage in an unordered way leads to overfilling of bins, rotting garbage smell, more fuel consumption of trucks and hence has adverse effects on the environment. Moreover, the capacity of garbage trucks is not utilized. With the development of smart cities around the globe, there is an increasing need for IoT based technological solutions for solid waste management which will help in promoting a clean and sustainable environment. The proposed system gathers the real-time garbage level of every bin with the help of ultrasonic sensors. This data is then used to generate dynamic routes for garbage trucks while considering several factors like capacity of trucks and bins, the distance between bins, and the level of garbage.

5.Title: Smart Garbage Management System .

Author: P. Jajoo, A. Mishra, S. Mehta and V. Solvande.

Published In: 2018 International Conference on Smart City and Emerging Technology (ICSCET).

Description: Swachh Bharat Abhiyan and digital India is a campaign by the government of India to keep infrastructure of the country clean and to make the cities smarter. Day by day the population of India is growing rapidly. At the same time, the garbage also is growing at the same rate. As a result, the garbage management is a problem that is quite hectic issue to solve. All Citizens of India are aware about the process followed to collect the garbage in the society. The Brihan Mumbai Municipal Corporation (BMC) sometimes fails to collect the garbage in some areas. It may cause pollution which leads to sanitary issues and disease. Therefore, some of the major steps must be carried out to solve the management of waste. The existing system is collection of garbage arbitrarily. So, some of the areas get left sometimes which may lead to unadorned smell and hence public health gets affected. The proposed project is quite helpful for both the Brihan Mumbai Municipal Corporation (BMC) and the citizens in that area by time-to-time interaction between Brihan Mumbai Municipal Corporation (BMC) and the proposed system. Hence the proposed system makes a better way to manage garbage.

6.Title: Automated Smart Garbage Monitoring System with Optimal Route Generation for Collection.

Author: A. Medehal, A. Annaluru, S. Bandyopadhyay and T. S. Chandar.

Published In: [2020 IEEE International Smart Cities Conference (ISC2)](.).

Description: One of the major concerns of the environment that strongly impacts the health and well-being of society is the detection, monitoring, and management of solid wastes. Slowly the world is stepping towards smart systems enabling complete automation of societies. The concept of smart cities, which is heavily based on Internet of Things (IoT) systems makes human lives more comfortable and secure in every aspect. As a result, smart waste management systems form an essential part of the establishment of smart cities. The conventional method of manually monitoring the wastes in waste bins is a tedious process and uses a lot of human effort, time, and cost which can easily be avoided with the current innovations. The garbage collection process is also highly redundant, inefficient, and can be vastly improved using Machine Learning (ML) algorithms. The purpose of this paper is to use the powerful tools of IoT to completely automate the process of garbage monitoring using ultrasonic sensors and NodeMCU and provide an optimal route for garbage collection using the cluster first-route second ML algorithm.

7.Title: IoT based solid waste management system.

Author: A. S. Bharadwaj, R. Rego and A. Chowdhury.

Description: The Internet of Things (IoT) is constantly evolving and is giving unique solutions to the everyday problems faced by man. "Smart City" is one such implementation aimed at improving the lifestyle of human beings. One of the major hurdles in most cities is its solid waste management, and effective management of the solid waste produced becomes an integral part of a smart city. This paper aims at providing an IoT based architectural solution to tackle the problems faced by the present solid waste management system. By providing a complete IoT based system, the process of tracking, collecting, and managing the solid waste can be easily automated and monitored efficiently. By taking the example of the solid waste management crisis of Bengaluru city, India, we have come up with the overall system architecture and protocol stack to give a IoT based solution to improve the reliability and efficiency of the system. By making use of sensors, we collect data from the garbage bins and send them to a gateway using LoRa technology. The data from various garbage bins are collected by the gateway and sent to the cloud over the Internet using the MQTT (Message Queue Telemetry Transport) protocol. The main advantage of the proposed system is the use of LoRa technology for data communication which enables long distance data transmission along with low power consumption as compared to Wi-Fi, Bluetooth or Zigbee.

8.Title: Smart waste management system.

Author: F. Folianto, Y. S. Low and W. L. Yeow.

Published In: [2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP)](#).

Description: In this paper, we present the Smartbin system that identifies fullness of litter bin. The system is designed to collect data and to deliver the data through wireless mesh network. The system also employs duty cycle technique to reduce power consumption and to maximize operational time. The Smartbin system was tested in an outdoor environment. Through the testbed, we collected data and applied sense-making methods to obtain litter bin utilization and litter bin daily seasonality information. With such information, litter bin providers and cleaning contractors are able to make better decision to increase productivity.

9.Title: An Efficient & Smart Waste Management System.

Author: B. S. Sasikanth, L. Naga Yoshita, G. N. Reddy and M. P.V.

Description: Waste Management is the most challenging issue of modern society. Fast growth in population, increased factory presence and modern lifestyle have contributed towards the large amount of waste. An efficient waste management system mainly revolves around waste segregation and processing. Segregation makes it effective to recycle and reuse the waste conventionally. This paper proposes a novel and efficient automated waste segregator and management system at household level. The prototype of the proposed system is developed using an Arduino microcontroller and Raspberry Pi, website to govern the entire process with comfort and simplicity. The most important part of the proposed system is the sensory unit which helps in segregating different types of waste. The module contains sensors for detecting moisture, metal so as to categorize different categories of waste. The major units of the segregating module consist of four noticeable components such as metal sensor, a moisture sensor, segregation bins and the camera, while the waste management is performed at the software system. Identification of waste is done by respective sensors. The microcontroller controls all the activity of the DC motor accordingly. The dry waste collected will be segregated through image analysis by the images captured using the camera. This quantity and other metadata of the collected waste is monitored via a website.

10.Title: Smart Bin For Waste Management System.

Author: S. Sreejith, R. Ramya, R. Roja and A. S. Kumar.

Published In: [2019 5th International Conference on Advanced Computing & Communication Systems (ICACCS)](.).

Description: This paper entitled "Smart Bin for Waste Management System" plays a vital role in the waste management system. A healthy domain is essential to a solid and cheerful environment. Clean and hygienic environments are a key need in human habitable environments. Smart bin is to develop a gainful and dynamic waste administration framework. In public places, dustbins are being flooded just as the waste spills out bringing about contamination. This likewise expands number of infections as huge number of bugs to breed on it. In this a smart bin is developed to monitor the level of waste, automatic disposing of waste and rain detection system. The outcome demonstrated that the detecting framework is effective and savvy and can be utilized to robotize any solid waste bin management process.