Proceedings of the Second International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC 2018)
IEEE Xplore Part Number:CFP18OZV-ART; ISBN:978-1-5386-1442-6

Survey on IOT in Waste Management System

Arshiya Khan
Information Technology
Vidyalankar Institute of Technology
Mumbai, India
arshu.khan23@gmail.com

Ajitkumar Khachane
Information Technology
Vidyalankar Institute of Technology
Mumbai, India
ajitkumar.khachane@vit.edu.in

***Abstract*— Clean and hygienic environment represents an important aspect in the society development. The flooded bins are making an unhygienic condition in the majority of urban area. A proficient brilliant waste accumulation framework must be created to defeat these circumstances. As the scope of IOT is developing day by day effective methods can be found out easily. Various designs were proposed and have advantages as well as disadvantages. This paper surveys a number of the more promising of technique within the field of waste control system.**

***Keywords*— cloud, e-waste, IOT, raspberry pi, sensors, smart waste bin, security issues, wireless sensor networks**

I. INTRODUCTION

Garbage management is becoming a worldwide problem due to increase in population, metropolitan government disorganization, lack of understanding among public, limited financial support for garbage management program. Due to the lack of care and attention of the authorities of the garbage cans, it always seems to be crowded. This disorganization creates a massive untidiness in the society. This survey paper give an idea about some useful solution so that authorities can take care and pay proper attention to the garbage bins .These solutions will definitely make the task of garbage collection more efficient and easier.

II. IOT IN GARBAGE MANAGEMENT SYSTEM

Garbage management domain is one of the numerous domains which has IOT based application. The development of IOT is enhancing present-day garbage management with promising technological and social forecast. Garbage management system uses interrelated intelligent devices to create a network for waste level analysis, monitoring of bins, and identifying situations automatically where waste authority's participation is necessary. IOT aided remote garbage monitoring system has several benefits over the conventional garbage monitoring system. If garbage monitoring devices are masked with inimitable identifiers like RFID, then those devices can be exclusively identified over the Internet. It acts as an information retriever, from the real world to the electronic world. An IOT aided garbage monitoring device is connected to the bin. A waste bin authority can observe a bin only at specific time a day but bin can fill at any moment of time, continuous monitoring of garbage level is important and it is necessary. As IOT enabled bins can easily be accessed with the help of Internet by other machines, hence the fill level of a bin can be supervised continuously, allowing filled bins to be detected immediately so that applicable actions can be taken. Also, IOT can help in collecting records thus, generating statistical information co-related to waste bin, by machines. It is faster and voluminous and error free assortment of data that conceivable manual methods could never achieve. Generating statistics, surveillance, risk drawing of diseases can be completed using waste bin data.

III. LITERATURE SURVEY

Many researchers have identified several issues in Garbage management domain, and proposed solutions using IOT thus contributed their research. These sections cover the literature survey.

Krishna Nirde , Prashant S. Mulay , Uttam M.Chaskar [1] are mainly paying attention on implementation of IOT based solid waste management system for smart city, which lets in faraway tracking of dustbin by municipal organization. The focus is on keeping urban areas clean by streamlining expense and time needed for it. With the help of this waste control device, waste control department send vehicle to collect bin as soon as they get alert SMS through GSM module which might be located at bin.

Abhay Shankar Bharadwaj, Rainer Rego [2] are mainly paying attention on implementation of IOT Based Solid Waste Management System. Gas sensor, IR sensor, load cell and furthermore LoRa technology are used by the system to avoid the troubles faced by using the present solid waste management system that send sensor data to gateway and from gateway to cloud using MQTT Protocol.

S. Vinoth Kumar, T. Senthil Kumaran, A. Krishna Kumar and Mahantesh Mathapati [3] designed smart waste management system using sensor system, microcontroller, GSM/GPRS. Ultrasonic sensor and force sensor is used to detect level and weight of the waste respectively. Also an android application is developed so that user can throw the garbage into the nearby bin. Muncipal authority can know the status of bin through web server. Thus this project is a solution

to a cost efficient continuous waste management system which is portable and non invasive.

Gopal Kirshna Shyam, Sunilkumar S. Manvi, Priyanka Bharti [4] has proposed a Smart Waste Management system using Internet-of-Things, in which data collected by sensor is transmitted to a remote server where it is stored for further processing. Based on these data routes are decided to pick bins from different locations. This system also predicts factors like traffic congestion, rate at which bins gets filled which leads to improvement in collection efficiency.

Abhimanyu Singh, Pankhuri Aggarwal, Rahul Arora [5] has made use of new technology of Raspberry Pi to communicate bins data which is gathered using infrared sensors to responsible managers. Depending upon bin data python based system puts up location on map so that bins can be collected through the optimized routes. This system improves scheduling process by making use of azure machine learning system which helps to predict time by which bins will be filled.

The paper proposed [6] an IOT Enabled Dustbins for tracking of the waste. Level sensor and toxicity sensor required for IOT enabled dustbins. Air quality sensor (CCS811) and ultrasonic Sensor (HC SR04) is used for implementation. Data like vehicles capacities and registration numbers, etc. are used to collects the waste. The proposed system reduces costs in collection process and maintains cleanliness by preventing spilling of waste all over the road.

Shashika Lokuliyana, J.A.D.C Anuradha Jayakodi, Lakmal Rupasinghe, Sachini Kandawala [7] focuses on using IGOE framework to automate the solid waste identification, localization and collection process. The data which is gathered is stored in database for analysis and alerting operation. Thus the approach focuses on making the system portable and cost effective. Results acquired from experiments demonstrate the productivity of the proposed system.

The paper [8] proposed a Smart Waste Management for Green Environment based on Bootstrap platform. They have used waterfall approach to build this project which mainly comprises of four crucial phases: planning and analysis, system design, system implementation and system testing. This provides an effective way to detect trash bins that require immediate collection by incorporating a sensor inside the trash bin.

Namakambo Muyunda, Muhammad Ibrahim [9] presents a solution which will allow the city authorities to better manage their resources in the collection of garbage and provide a platform that will allow for an efficient garbage collection system. Sensor Node device can monitor the state of a garbage bin and relay the monitored state to a central database. Sensor data is displayed on a webpage to alert the relevant authorities. Route is planned based upon priorities and fill level of each bin. Thus the device is a solution to a cost efficient continuous waste management system.

Jetendra Joshi, Joshitha Reddy, Praaneeth Reddy, Akshay Agarwal, Rahul Agarwal, Amrit Bagga, and Abhinandan Bhargava [10] have implemented a SmartBin based on the Stack Based Front End approach. Machine Learning systems and Decision Forest Regression model connected to sensor to increase helpful experiences to enhance the productivity of the garbage monitoring.

IV. CONCLUSION

From the above literature survey it is clear that IOT has greatly enhanced the quality and efficiency of waste management systems and also contributed to respond to public health. The incorporation between wireless sensor networks, cloud computing, raspberry pi and many other technologies has greatly improved waste management processes such as waste bin monitoring with least cost, better care and services to citizens and improving staff performance, increasing the security of individuals etc.

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