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A Review of Smart Garbage Monitoring and Solid Waste Management System

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Abstract

In current scenario, the cleanliness of public places as well as private places are very necessary to make the environment healthy by spreading some deadly diseases, to avoid such situation smart garbage collection bins or Dust bin monitoring system is required. The collection of solid waste is also a need of common people as increased population growth. The workers who have to collect the garbage from different areas are not able to get correct information when would be the bins are filled. Sometimes it gets overflowed due to improper information, so they used to fix some timing for collecting the wastage or garbage. To overcome such kind of situations efficient garbage monitoring and cleanliness tracker system need to develop to make an effort to manage the waste and each has its advantages and disadvantages. This paper gives a brief literature review and observes previous research on different topics which includes different efficient techniques that can be used to manage the waste efficiently.

Keywords: *Garbage monitoring, Cleanliness, Tracker system*

INTRODUCTION

Over population in world it leads to increase in waste. People's faces major environmental challenges associated with reduced waste collection, transport and disposal. Hence garbage management is becoming a major problem. Compared to village more wastes are generated in cities and due to this the environment gets polluted and public health is also affected. All the above problems are solved can be solved by implementing the smart garbage collector dust bins and cleanliness tracker system. If in the public places the wastage are there then the corporation workers will get the alert to clean the particular area. So it will be helpful for them to identify whether the dustbins are fully filled or not. With the help of garbage monitoring and tracker system workers can collect the garbage time to time to make the environment healthy. Old system need more man power for waste management; by this system we can reduce the man power with the help of tracking system is interfaced with IOT.

REVIEW OF LITERATURE

In the view of last Ten years (2010-2020) research studies conducted so far on Smart Garbage Monitoring and Cleanliness tracker System.

SR. NO.	AUTHOR	YEAR	TITLE	AREA/ COUNTRY	OBJECTIVE	FINDINGS

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1	Mihai T. Lazarescu	2013	Design of a WSN Platform for Long-Term Environmental Monitoring for IoT Applications		This paper presents the functional design and implementation of a complete WSN platform that can be used for a range of long-term environmental monitoring IoT applications.	The researcher addresses all phases of the practical development from scratch of a full custom WSN platform and they guided the specification, optimization and development of WSN platforms for other IoT application domains.
2	Insung Hong, Sunghoi Park	2014	IoT-Based Smart Garbage System for Efficient Food Waste Management	Korea	In this paper, an IoT-based smart garbage system (SGS) is proposed to reduce the amount of food waste. In an SGS, battery-based smart garbage bins (SGBs) exchange information with each other using wireless mesh networks, and a router and server collect and analyze the information for service provisioning.	The researcher implemented the system in Gangnam district for a one-year period as a pilot project and verified the results. The researcher found the adaptive user-oriented charge policy resulted in a reduction of food waste of about 33%, and it is expected that the system will thereby improve the efficiency of food waste management.
3	Dr. N. Sathish Kumar	2016	IOT Based Smart Garbage alert system using Arduino UNO	India	The main theme of work is to develop a smart intelligent garbage alert system for a proper garbage management. The paper also focused on the use of the ultrasonic sensor which is interfaced with arduino UNO to check the level of garbage filled in the dustbin and sends the alert to the	The researcher has developed an embedded based intelligent alert system. This devised for the proper monitoring and maintenance of the garbage also gives the prevents the irregular cleaning of the dustbins by sending alerts to the concerned individual at regular intervals.

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					municipal web server once if garbage is filled	
4	Arko Djajadi	2016	Ambient Environmental Quality Monitoring Using IoT Sensor Network	Indonesia	This paper is focused on a small step toward this global issue to help acquiring factual ambient environmental parameters. They provide the solution is in the form of an Internet of Things (IoT) module that can be easily organized in the desired geographical area	The researcher found that the module works well for both indoor and outdoor environment. Coverage area of sensors might be reason why sensors have bigger standard deviation. Temperature and humidity sensor and alcohol sensor give stable result both indoor and outdoor and the result is stable based on its standard deviation and systematic error
5	Vincenzo Catania, Daniela Ventura	2016	An Approch for Monitoring and Smart Planning of Urban Solid Waste Management Using Smart-M3 Platform	Italy	The use of Biometric cryptosystem scheme namely fuzzy vault and fuzzy commitment is used to defend the pattern which is extracted from the Multimodal biometrics and Two-Tier Security	The result shows that a mechanism for collecting “green points” was introduced for encouraging citizens to recycle.
6	Mokshada V. Patil	2017	A Review on Internet of Things Based Garbage Bins Detection Systems	India	The main goal of this paper is to work on environmental issues due to improper waste disposal and solve them for better health and hygiene of the people.	The results of the study integrates different sensing and communication technologies to monitor real time bin information that can enrich the efficiency of solid waste collection and ensure the timely removal of waste resulting in green and pleasant environment using IoT.

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7	Somu Satyamanikanta and M.Narayanan	2017	Smart Garbage Monitoring System Using Sensors With Rfid Over Internet Of Things	India	This paper proposing new garbage collecting way to dispose the waste by using the latest technology like some sensors are connecting a some sensors to the bin	The researcher concludes that by using smart garbage monitoring system using RFID over IOT's they can easily dispose the waste present in the garbage bins as early as possible without it affecting to the people and keep the surroundings clean.
8	Pallavi Chaudhari	2017	Comparative analysis of Garbage Management and Tracking System using IOT	India	The paper comparing three proposed garbage systems which are IOT Based Intelligent Bin for smart cities, Smart Garbage Collection Bin Overflows Indicator using Internet of Things, IOT based smart garbage alert system using arduino UNO	The researcher found that each bin should assigned with a unique id and consist of some amount of garbage. The hardware which is the electronic device (ie.Node MCU) is already connected to the dustbin, later each time the garbage is added to the bins the sensors identify the level and if the bin is 80% full, the unique id of the bin is transmitted to the controller.
9	Nirde and Muley,	2017	IoT Based Solid Waste Management System for Smart City,	India	Researcher focused on to enhance the practicality of IOT based Wireless Smart Wastage Management system	Researcher develops the practicality of internet of things based solid waste management and collection system for smart city.
10	Trushali Vasagade,	2017	Dynamic Solid Waste Collection and Management System Based On Sensors, Elevator and GSM	India	The study describes the concept to implement and provides optimum solution for the major issue of managing solid waste properly in terms of collecting it and cleaning waste thrown	The result analysis of system proposed can be given in two forms: A. Accuracy of system in terms of cleaning garbage present outside the system B. Real time alert message sending based on sensor data.

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					outside the dustbin.	
11	Sharaaf N. A. Hijaz A	2017	Easy Clean – A Smart Solution for Garbage Finding and Collecting	Shri Lanka	This paper focused on the use of various sensors such as load cell sensors, ultrasonic sensors and Global Positioning System (GPS) module to track location and status of bins, GSM/GPRS shield for data transmission and arduino MEGA 2560 to interface the hardware units	Author provides the comprehensive solutions to the people that the system could read and transmit current status of the bin to the server. And also send required information of solid waste management using a centralized system. They are Developing the mobile applications to assisted driver with the collection.
12	T.G.Dhaarani, G.Ramya Shree	2018	Automated self-navigating smart dustbin using IOT	India	The paper is highlighted; the level, rain and gas sensors are used to detect the respective parameters and garbage level is monitored by using IoT system and take necessary steps. Also focused on automatically opens the lid when it detects the people who want to throw out their trash.	The researcher has developed an efficient waste management system and IOT based technology is used to provide better garbage disposal methods in urban areas. They used sensors to indicate the level of garbage in the bin.
13	Dr. P. Premkuram, P. Jeeva	2018	Smart Garbage System Using Internet of Things	India	The paper focused on the use of ultrasonic sensor and infrared sensor for automatic open closing of lid also with level detection, which became a hygienic and healthier way to use trash.	The results summarized the adaptive user-oriented charge policy is used to motivate residents to reduce their waste, and Web-based services are provided to achieve more efficiency in the disposal and collection processes.

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14	Dr. Jittendranath Mungara, Shobha	2018	Survey on Smart Garbage Monitoring System Using Internet of Things (IOT)	India	The paper throws light on survey on few of the techniques and methodologies to improve the garbage monitoring system using wireless sensors.	They found that multi-layer waste management system architecture for design of a RFID; Using WIWSBIS, waste management service providers have a chance to track a waste identity, weight, missing/stolen bins quickly and accurately without human intervention.
15	Abdullah Alfarrarjeh	2018	Image Classification to Determine the Level of Street Cleanliness: A Case Study	USA	This paper propose a geo-spatial classification approach to enhance the classification accuracy, also presents a case study of street cleanliness classification using a large real-world geo-tagged image dataset obtained from Los Angeles Sanitation Department (LASAN).	The results found that due to the visual differences in street scenes across geographical regions, researcher proposed a classification scheme with multiple local trained models utilizing the geospatial characteristics associated with the images. The best variant of their approach achieved an F1 score of 0.9
16	S.Loganayagi, C.Jeyabharathi	2019	Development of an IOT System for Efficient Classification and Management of Solid Waste in Indian Cities- A Research	India	The researcher has made detailed survey on solid management system based on Internet of Things is proposed which permits the municipal corporations to supervise the dustbin status over web server remotely and maintain the cities clean by optimizing	The researcher develops the internet of things practicality based on the management and collection of solid waste for smart city. He also designed automatic sensing system i using load cell and ultrasonic sensor to provide an automatic and efficient status of dustbin monitoring system

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					time and cost needed for it	
17	M.Vishnu Monishan	2019	Implementation of Novel Optimal Scheduling and Routing Algorithm on IoT-Based Garbage Disposal System	India	The researcher proposes a novel IoT-based system for garbage collection and disposal which integrates house hold bins (HHB) and mobile garbage collector (MGC) which have mobility for automatic garbage collection and disposal	The result indicates the integration of HHB's and MGC's for automating the collection and disposal of house-hold wastes. The author was experimentally evaluated the novel algorithm on trial-run under test-bed environment.
18	Swarna M, K J Anoop	2019	Iot Based Garbage Box Monitoring System	India	This paper focuses on a comprehensive and detailed investigation of waste management models execution of smart procedure as a key enabling technology in contemporary trash management system.	Researcher concluded that the system is so much helpful for monitoring the bins effectively without Over flowing onto the streets
19	Sonali Joshi	2019	Smart Dustbin using GPS Tracking	India	This paper throws light on developed three subsystems: smart waste bin and real-time monitoring system that are interconnected to perform as an efficient waste management system that yields to a green and healthy living environment.	Study indicates that the hardware detects the level of garbage and the application sends the notification of garbage retrieval, it saves effort of garbage collectors by saving their time and cost of fuel of the vehicle.
20	B.Rajapandian,	2019	Smart Dustbin	India	The paper focused on to find a solution	The analysis of results is the usage of

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	K.Madhanamohan				by using a Smart Dustbin which is GSM and GPS enabled. They used an 'Ultrasonic Sensor' and a 'Gas sensor' to prevent overflow of dustbin as well as sense of bad odour and ensures timely disposal of the unhygienic contents of the Dustbin	advanced Controller in the form of arduino along with GSM and GPS enabled system enhances the effectiveness of the overall solid waste segregation, collection and disposal system.
21	R. Sureshkumar, S.U.Prabha,	2019	Smart Garbage Management System Using Gps and Gsm	India	The paper is used to detect the level of bins automatically and the send data to the cloud and display it using user interface. Ultrasonic sensor is gives data based on the bins level in the garbage. arduino is used to process the data from it and the NODE MCU is used to send the data to the cloud by interfacing arduino with NODE MCU	The result identifies automation and embedded system to waste collection and provides a practical solution to help waste management system.

Objectives

The paper primarily aims to present the study of existing cleanliness techniques and improvements in garbage collection to make it more efficient and effective by providing the real time status of the garbage bins.

1. To get the real time data of the garbage bin and sending the status to centralize system.
2. To improve the efficiency of the existing garbage collection system.
3. To achieve the benefits of the timely cleaning of garbage bins and saving of the fuel of garbage collection vehicle.

Conclusion

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Authors has studied the number of literatures / Research reviews currently carried out by stated references to get an idea about the research done in various areas of smart garbage monitoring and cleanliness tracker system. The objective of this study was to improve the efficiency of garbage collection system by providing them real time information of the status of garbage collection bins which enables them to take action on the garbage bins located in specific area. In this way time can be managed and solid waste can be monitored effectively hence it is helpful for monitoring the bins effectively without over flowing into the specific areas.

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