**St. PETER’S COLLEGE OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

PNT2022TMID36575 - SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN

**Literature Survey**

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| **SL.**  **NO** | **TITLE OF THE PAPER** | **AUTHOR** | **JOURNAL/CONFERENCE** | **FINDINGS** |
|  | Smart Garbage Monitoring System using Internet of Things(IoT) | [Prakash Kanade](https://ieeexplore.ieee.org/author/37088859535) et. al., | [2021 5th International Conference on Computing Methodologies and Communication (ICCMC)](https://ieeexplore.ieee.org/xpl/conhome/9417811/proceeding)  DOI: [10.1109/ICCMC51019.2021.9418359](https://doi.org/10.1109/ICCMC51019.2021.9418359) | * An IoT-based trash checking system utilizing Arduino or Raspberry pi board and an open IoT stage * Proposed framework includes an Arduino microcontroller, ultrasonic sensor, Wi-Fi module and a heap battery. * Information from the ultrasonic sensor and burden cell is obtained by using the Arduino microcontroller. * By utilizing an ultrasonic sensor, the profundity of the trash in the compartment is resolved and the heaviness of the waste receptacle from the heap cell is also estimated. * For indicating the information, the LCD screen is utilized. * The Wi-Fi module sends to the web the information portrayed previously. * Thingspeak and an open IoT discussion is utilized to follow the trash framework. |
|  | Smart Garbage Monitoring System based on Internet of Things (IoT) | Nisha Bhatele,  Tanya Shrivastava | International Research Journal of Engineering and Technology (IRJET)  Volume: 07 Issue: 05 | May 2020 | * This system monitors the garbage bins and notifies about the level of garbage collected in the bins via a webpage. * This system makes use of ultrasonic sensors that are positioned over the bins to detect the garbage level. * Also, it has an Arduino board, LCD Screen, Wi-Fi modem for sending data, and a buzzer. The system is powered by a 12V transformer. |
|  | IoT-Based Framework for Smart Waste Monitoring and Control System: A Case Study for Smart Cities † | Sani Abba  Chinaka Ihechukwu Light | Eng. Proc. 2020, 2, 90; doi:10.3390/ecsa-7-08224 | * Arduino microcontroller working with the ultrasonic sensors that detects the level of waste in the garbage bin placed in garbage locations is designed * This at regular intervals display the status information as “filled”, “half-filled”, or “empty” on an LCD screen * Also sends the content level information at those intervals to a central web-server system that displays the garbage bin levels graphically. * This is achieved using a microcontroller, a Wi-Fi module, and ultrasonic sensors. * The programming of the Arduino Uno microcontroller is done with an Arduino IDE and embedded C programming language. * The communication with the web server is done using the hypertext preprocessor PHP scripting programming language. * The prototype uses Proteus 8.0 professional simulation software |
|  | Smart Garbage Monitoring System using Internet of Things | Prince Kelvin Owusu | Middle East Journal of Applied Science & Technology (MEJAST) Vol.3, Iss.2, Pages 74-82, April-June 2020 | * The system sends signals through a sensor to a garbage collection unit * Alerts that this unit of the collection of the garbage is full. * Extreme programming (XP) method is used in building the system which uses ultrasonic sensors placed in the lids of the bins to detect the garbage level and compare it with the garbage bins depth. * The system makes use of AVR family microcontroller, LEDs, a SIM800L GSM/GPRS Module and was powdered by a 12V transformer. * Use of this system assisted in identifying places or areas where garbage bins are full for collection and disposal. * Companies that adapted the use of this system achieved their goals of collecting bins at the right time as compare to companies that were not making use of such technology. |
|  | Smart Garbage Monitoring System Using IoT | Shuruthi.l et. al., | MAR 2019 | IRE Journals | Volume 2 Issue 9 | ISSN: 2456-8880 | * The proposed system is an advanced method in which waste management is easy to handle. * IoT is an emerging technology with an increasing range of applications leads to development of new advanced technologies and methods for the enhancement of IoT environment. * In this system, objects are connected and controlled by the internet. * Smart Garbage monitoring system using IoT is an effective design which will help the cities to keep the environment clean. |
|  | IoT Based Garbage Monitoring and Street Light Control | K.Bagyalakshmi et. al., | Asian Journal of Science and Applied Technology ISSN: 2249-0698 Vol. 7 No. 2, 2018, pp.33-37 | * Multiple dustbins are located throughout the city. * They are fitted with a special type of sensors known as ultrasonic sensor which is used to detect the level of garbage in these dustbins. * This data is then send to the Arduino microcontroller,which receives this data. * This is send to the IoT board via a level converter. * The IoT board uses a sim card for transfer of data to the cloud. * The garbage values are continuously updated in the web page. * An unique ID will be provided for every dustbin in the city so that garbage level can be monitored. * 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 dustbin. * When the dustbin is full a message is also send via GSM to the concerned authorities. |
|  | Garbage monitoring system using IoT | Anitha A | IOP Conf. Series: Materials Science and Engineering 263 (2017) 042027 doi:10.1088/1757-899X/263/4/042027 | * A system which will notify the corporations to empty the bin on time. * A sensor is put on top of the garbage bin which will detect the total level of garbage inside it according to the total size of the bin. * When the garbage will reach the maximum level, a notification will be sent to the corporation's office, then the employees can take further actions to empty the bin. * This system will help in cleaning the city in a better way. * By using this system people do not have to check all the systems manually but they will get a notification when the bin will get filled |
|  | IoT Based Intelligent Garbage Monitoring System | Eveneet Johar et. al., | International Journal of Engineering and Techniques - Volume 4 Issue 2, Mar-Apr 2018 | * This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. * For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. * The system makes use of Arduino family microcontroller to control every process and Wi-Fi modem for sending data to server. * Dustbins are provided with low cost embedded device which helps in tracking the level of the garbage bins * An unique ID will be provided for every dustbin 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. |
|  | SMART CITY- GARBAGE MONITORING SYSTEM USING IOT | Shabanaafreen Hussain et. al., | JARIIE-ISSN(O)-2395-4396, Vol-4 Issue-3, 2018 | * IOT is the network of physical devices embedded with software and sensors and network connectivity which enables these objects to collect and exchange data. * This system will monitor the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. * This web page also contain all information about garbage collection vehicles. * If the Garbage Collector is filled up to its threshold value then the message is displayed on web portal and the responsible authority take proper action also all the information regarding to the level of Garbage present within the Smart Bin is displayed on to the Smart Bin Application on the users mobile phone. * This is an advanced method in which waste management is automated |
|  | Smart Garbage Monitoring System using IOT | K. Maheshwaran et. al., | International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 | * This process is aided by 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 municipal web server once if garbage is filled. * After cleaning the dustbin, the driver confirms the task of emptying the garbage with the aid of RFID Tag. * RFID is a computing technology that is used for verification process and in addition, it also enhances the smart garbage alert system by providing automatic identification of garbage filled in the dustbin and sends the status of clean-up to the server affirming that the work is done. * The whole process is upheld by an embedded module integrated with RFID and IOT Facilitation. * An Android application is developed and linked to a web server to intimate the alerts from the microcontroller to the urban office and to perform the remote monitoring of the cleaning process, done by the workers, thereby reducing the manual process of monitoring and verification |
|  | Smart Garbage Monitoring System using Internet of Things (IOT) | Dr. Sandeep M. Chaware et. Al., | International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, Vol. 5, Issue 1, January 2017 | * The system makes use of Arduino family microcontroller, LCD screen, Wi-Fi modem for sending data and a buzzer. * The system is powered by a 12V transformer. * The LCD screen is used to display the status of the level of garbage collected in the bins. * Whereas a web page is built to show the status to the user monitoring it. * The web page gives a graphical view of the garbage bins and highlights the garbage collected in colour in order to show the level of garbage collected. * The LCD screen shows the status of the garbage level. * The system puts on the buzzer when the level of garbage collected crosses the set limit. |
|  | Garbage Monitoring System Using IOT | Ashima Bajaj  Sumanth Reddy | International Journal of Pure and Applied Mathematics, Volume 114 No. 12 2017, 155-161 | * To design a system based on microcontroller using zigbee methodology for collecting garbage from particular area whose garbage bins are overflowing with prior concern. * This method is advanced in which garbage management is automated. * This system makes use of microcontroller, LCD screen, zigbee methodology for sending data. * Ultra sonic sensors are used to detect the level of garbage collected in the bins. The LCD screen is used to display the level of garbage collected in the bins |
|  | IOT based Smart Garbage and Waste Collection Bin | Navghane S S et. al., | International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) 1576-78,2016 | * Suggest a method of garbage management in which a microcontroller is used. * The bin was interfaced with a microcontroller which IR wireless systems with a Central Monitoring System which show the current status of garbage in that bin. * The status can be seen on the mobile-based browser with the HTML webpage by using Wi-Fi. * This system is not cumbersome, it has a low cost, as they only used weight-based sensors on the receiver’s side, and on the sender’s side, they use the Wi-Fi module. * Actions are taken based on analysis done after receiving the informative data. |
|  | A Novel approach to Garbage Management Using the Internet of Things for smart cities | Kasliwal Manasi H et. al., | International Journal of Current Trends in Engineering & Research.2016 | * A method of collection of garbage considering in both the commercial and residential areas of the society. * Ultrasonic sensors are used for the level detection of the garbage-filled in the bins. * These sensors after detecting the level will send the data then to the Control Room using the GSM module. * GUI was developed and it was based on the MATLAB. * Two units are present in the system, the Slave unit, and the Master unit. * The Slave unit present in the bin whereas the master bin was in the control room. * The sensors used will receive the data and it will transmit the data through the slave unit on the lid to the master unit in the control room. * Then based on data received the authorities further take the actions. |
|  | Smart Dustbin-An Efficient Garbage Monitoring System | Monika KA et. Al., | International Journal of Engineering Science and Computing 7113-16, 2016 | * smart bin is built on a platform using Arduino and interfaced with a GSM modem and ultrasonic sensors. * The Sensor is placed and adjusted at the inner side of the lid such that it can easily detect the level filled such as in RADAR. * A threshold level was set as 10cm. * A threshold level is a standardized level which when reached by the garbage, the sensors detect it and triggers the GSM modem which then alerts the authority to analyze the condition of the bin. * The authority then orders to empty the dustbins manually. * Unless the bin is emptied the modem keeps on alerting the authority unless it’s emptied |
|  | IoT-Based Smart Garbage System for Efficient Food Waste Management | Insung Hong et. al | Scientific World Journal Volume 2014, Article ID 646953, 13 pages http://dx.doi.org/10.1155/2014/646953 | * An IoT-based smart garbage system (SGS) is proposed to reduce the amount of food waste. * The battery-based smart garbage bins (SGBs) exchange information with each other using wireless mesh networks * A router and server collect and analyze the information for service provisioning. * Includes various IoT techniques considering user convenience and increases the battery lifetime * Two types of energy-efficient operations of the SGBs: stand-alone operation and cooperation-based operation. * Showed that the average amount of food waste could be reduced by 33%. |