

Smart Waste Management System For Metropolitan Cities Technology: IOT

1. Cloud based smart waste management for smart cities

<https://ieeexplore.ieee.org/document/8645576>

Authors: Mohammad Aazam, Marc St-Hilaire, Chung-Horng Lung, Ioannis Lambadaris

This paper focuses on waste management in urban cities, With increasing population and also changes in lifestyle municipal solid waste generation is increasing significantly. Hence waste management is a challenge in urban cities. The overall waste management involves three main types of entities, they are people who generate waste, waste collectors/city admin, stakeholders. Most of the waste is of organic matter, comprising 44.4%. These data of contents in the waste management is sent to stakeholder using cloud and also in order to have a complete waste management mechanism, it is very important to have a smart way of notifying the quantity of each type of waste and involve the stakeholders effectively. They say that we can perform big data analysis on the data gathered from waste management. These analysis of the overall waste management can then be used to create further services from the cloud and analyze it in a more depth way to perform waste recycling. The methodologies that were mentioned in this paper were hadoop cluster and also performing analytics on the database from hadoop cluster.

2. An Internet of Things Based Smart Waste Management System Using LoRa and Tensorflow Deep Learning Model - 12.08.2020

<https://ieeexplore.ieee.org/document/9165744>

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The traditional waste management system is replaced with smart sensors embedded into the system to perform real time monitoring and better waste management. The aim of this research is to develop a smart waste management system using the LoRa communication protocol and TensorFlow based deep learning model. LoRa sends the sensor data and Tensorflow performs real time object detection and classification. The bin consists of several compartments to segregate the waste including metal, plastic, paper, and general waste compartments which are controlled by the servo motors.

Object detection and waste classification is done in the TensorFlow framework with a pre-trained object detection model. This object detection model is trained with images of waste to generate an inference graph used for object detection which is done through a camera connected to the Raspberry Pi 3 Model B+ as the main processing unit. Ultrasonic sensor is embedded into each waste compartment to monitor the filling level of the waste. A GPS module is integrated to monitor the location and real time of the bin. LoRa communication protocol is used to transmit data about the location, real time and filling level of the bin. The RFID module is embedded for

the purpose of waste management personnel identification. The camera module is connected to Raspberry Pi to capture the waste which is thrown for object detection and identification, based on the object the Raspberry Pi will actuate the opening or closing of the garbage bin. Only authorized personnel are allowed to access the garbage bins using RFID. An ultrasonic sensor is used to detect the level of the garbage in the bins and GPS is used to get the location of the bins in real-time. The limitations are, this model is not ideal for household garbage collection, filling of individual compartments require it to be disposed at different times which is not an efficient way.

3. 'IOT Based Smart Waste Management System' 2021

<https://ieeexplore.ieee.org/document/9528293>

Authors: Gayathri N , Divagaran A R, Akhilesh C D, Aswiin V M, Charan N

They have designed a smart waste management system that monitors the amount of food waste in a particular organization. RFID technology is used by the user to scan and open the bin thereby allowing to keep track of every individual's food wastage and a load cell is used to measure the amount of food wastage. Thus this project allows an organization to keep track of waste generated, an individual's contribution and an analysis report is generated.

4. Survey on waste management monitoring System based on IOT

<https://www.ijirts.org/volume8issue3/IJIRTS204202.pdf>

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Solid waste management is the collecting,treating and disposing of solid material that is discarded.As there are some improper disposal of municipal solid waste which can create unsanitary conditions.For evacuating purpose the bins been installed a continuous mountain of the waste levels.The location of the dustbins with the help of the GPRS VKE module which helps the Municipality to locate the Dustbins.With the help of GSM SIM module, the percentage of the dust bins filled will be sent to the truck driver to take the waste from the bins.Thus this project allows an organization to keep track of waste generated, an individual's contribution and an analysis report is generated.

5. Smart Waste Management System for Crowded area Makkah and Holy Sites as a Model

<https://ieeexplore.ieee.org/document/8389897>

Authors: Dr. Rasha Elhassan, Dr. Mahmoud Ali Ahmed, Mrs. Randa Abdalhalem

This paper focuses on how to handle waste in holy sites and makah as a model .During waste management there are three key challenges we face here , small area, short period of time and the increasing of the Pilgrimages' member.The system proposed by them will use sensors inside the container 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 main technologies used and proposed by them was Internet of Thing,Sensor, Big Data.The different sensors used for categorize the waste are Capacitive proximity sensors separate papers and plastic inside the trash can, the metal sensor is used to detect metal,the infrared sensor detects glass.Then

after categorizing the waste through GSM/GPRS the Arduino IDE system sends SMS to the waste vehicle through Radio Frequency receiver when the trash can is full.

6. Optimal Policy-Making for Municipal Waste Management Based on Predictive Model Optimization

<https://ieeexplore.ieee.org/document/9284435>

Authors: Shabir Ahmad, Imran , Naeem Iqbal , Faisal Jamil , And Dohyeun Kim

It is to define policy in terms of the number of waste collection human resources cost, waste carrier's vehicle cost and fuel cost. Thus, the paper aims to suggest the number of resources which lead to a minimum cost and also ensure a certain level of hygiene in the area. The analysis is carried out on the solid waste dataset of 2017-2019 generated from different residential grids in Korea. The sensors installed on bin record the time of the waste hit, the amount of waste and other information such as grid ID in which the bin is placed. This information is sent to municipal authorities to collect grid statistics such as population of grid, male and female members, grid coordinates, the waste amount for weekdays, and monthly data for 2017 to 2019 in a periodic manner.