SMART WASTE MANAGEMENT FOR METROPOLITAN CITIES

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ABSTRACT:

The solid waste is increasing in urban and rural areas as the population is increasing and waste management has become a global concern. In implementing the smart cities the great challenge is how to manage waste with low cost and high performance. Waste has a negative impact on the quality of society which smart cities aim to improve. The process of collecting wastes, separating it, and transporting the containers daily and quickly to avoid any prospect of a spread of diseases is a complex process. The Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. With the help of IOT, garbage in the cities can be collected on monitoring the bin level, to prevent overflow of the garbage which negatively impacts the environment and to avoid or postpone garbage collection schedules in case of low garbage levels.

REQUIREMENTS:

1. Software Requirements:

●Python IDLE

●Node Red

● Arduino IDE

2. Hardware Requirements:

●Arduino UNO

●Ultrasonic Sensor

●IR Sensor

● DC Motor

● Weight Sensor

3. System Requirements:

●RAM-Minimum 4GB

●Minimum Processor

● Configuration OS -Windows/Mac/Linux

LITERATURE SURVEY:

A number of researches and reviews have been done over the past few decades on the topic of 'SMART WASTE MANAGEMENT FOR METROPOLITAN CITIES'. A few notable of them are given below.

Mohammad Aazam, Marc St-Hilaire, Chung-Horng Lung, Ioannis Lambadaris (2016)

Mohammad Aazam et al proposed Cloud SWAM, in which each bin is equipped with sensors to notify its waste level. Different bins for each category of waste, namely: organic, plastic/paper/bottle, and metal. In this way, each type of waste is already separated and through the status, it is known how much of waste is collected and of what type. The availability of data stored in the cloud can be useful for different entities and stakeholders in different ways. Analysis and planning can start from as soon as waste

starts gathering and up to when recycling and import/export related matters are conducted. The system Cloud SWAM provides Timely waste collection. Timely and efficient way of collecting waste leads to better health, hygiene, and disposal. The system provides the shortest path to the location of waste bins. So the collectors can plan a better and fuel efficient route.

Dr. N. Sathish Kumar, B.Vijayalakshmi, R. Jenifer Prarthana, A .Shankar

Designed a smart dustbin in which the dustbin gets blocked when it reaches a threshold value. The ultrasonic sensor measures the waste volume .The microcontroller reads the data from the sensor and alerts the server. For the verification process RFID tag (ID card of the cleaner) interrupts the RFID reader, the ultrasonic sensor checks the status of the dustbin and sends it to the web server. An android application is used to view the alerts and status at the server end.

Belal Chowdhury and Morshed U. Chowdhury

Designed a five layer architecture for RFID and sensor based waste management systems. The layers are named as physical layer, middleware layer, process layer, data access layer and user interface layer. The physical layer consists of the actual RFID hardware components and it includes RFID waste tag, reader and antennas. Middleware layer is act as the interface between the RFID reader, load cell sensor and waste management service providers (i.e., waste collectors, and municipalities) IT system. The important element of RFID and load cell sensor systems is the middleware layer , which is viewed as the central nervous system from the waste management system perspective. This layer enables waste management service provider's (e.g., waste collector) a quick connectivity with RFID readers and load cell sensors and also the layer lowers the volume of information that waste management system applications need to process, by grouping and filtering raw RFID and load cell data from readers and sensors respectively. An application-level interface is provided by a middleware layer for managing RFID readers, and load cell sensors for processing large volumes of waste data for their applications.

Mohd Helmy Abd Wahab, Aeslina Abdul Kadir, Mohd Razali Tomari and Mohamad Hairol Jabbar (2014)

Proposed a Smart Recycle Bin that caters for recycling glass, paper, aluminum can and plastic products. It automatically evaluates the value of the wastes thrown accordingly and provides a 3R card. The recycle system enables collection of points for performing a disposal activity into designated recycle bins. Such a system encourages recycling activities by allowing the points to be redeemable for products or services. The system records the data related to the disposal activities, disposed material, identification of the user and points collected by the user. The user has to touch his card to the specified RFID reader at the recycle bin. Recycle bin doors open and the user puts waste one by one. A microcontroller processes information about his user ID and number of wastes and sends it to a database server. The database server calculates the user points and updates it. The system provides user login to an online system to check his total points.

Fachmin F olianto, Yong Sheng Low and Wai Leong Yeow (2015)

Proposed Smart bin system has 3 –tier architecture.The ultrasonic sensor installed in every Smartbin senses bin fullness and reports readings and sensor statuses. The sensor reading is transmitted to the gateway nod which is installed in every sensor cluster. It forwards the information to the backend server. The analytics module in the back end server analyzes data collected by the bin sub system. The analytics module processes fullness readings, compares against predefined rules, and generates events upon exceeding threshold. The bin sub-system sends information to the workstation and it shows meaningful information to users through a graphical user interface.

Keerthana b et al. (2017)

Designed an internet of bins for trash management in India. The smart TRASH management system using sensor, microcontroller and other modules ensures emptying of dustbins appropriately when the garbage level reaches its maximum. Two threshold limits are set for the bins and an alert message is sent to the van that collects the trash if the waste amount reaches these thresholds. The system further allows the people to drop down the trash bags into the bins till it reaches the threshold limit .It waits for the acknowledgment from the van to clear off the bin and if the acknowledgment is not received it is sent again when it reaches the threshold limit and the bin gets locked. When the bin gets locked it displays the message “Overloaded”. Then the dustbin will be monitored for a specific time and when not cleared within a certain time limit, then a message will be sent to the higher authority who can take appropriate action.

CONCLUSION:

This project is very effective in managing waste in any big metropolitan city. Rather than using conventional periodic collection methods, a priority system is used to ensure the city is clean all the time without any overflowing dumpsters. In most of the metro cities globally poses a challenge to effective waste management and maintenance of the waste bins. In our project, an IOT enabled Smart Waste Bin with real-time monitoring is helpful

- To ensure the protection of the environment through effective waste management.
- To Ensure separation of waste
- To prevent pollution and ecological degradation.
- To protect the health and wellbeing of people by providing an affordable waste collection service.
- To avoid Overflowing of trash cans.

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