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Smart Solid Waste Management System Using IOT

M.P. Sureshkumar[1*], S.Pavithran[1]

[1] *Assistant Professor Department Of Civil Engineering, K.S.Rangasamy College Of Technology, Tamil Nadu, India.*

**Corresponding author E-Mail ID: sureshkumarmp@gmail.com,*

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ABSTRACT

The smart city consists not only the suffocated facilities but also it should consist of a smart solid waste management system. The huge generation of solid waste and shortage of land for dumping results in search of best schemes. Collection, transportation, and disposal of solid waste is a huge concern and also a very challenging task. Proper tools like IoT should be employed to integrate these works smoothly and efficiently. IoT consists of sensors which help in indicating the waste levels and collection routes to the server, from which the waste was collected in a quick and efficient manner. IoT contributes in all stages of waste management, which results in saving of time and money.

Keywords: IoT, Waste Management, Solid Waste,

1. INTRODUCTION

The ultimate goal of IoT applications in waste management is producing leaner operations and delivering higher quality services to citizens. IoT applications in waste management are engaging citizens and cities alike in the project of making our waste practices more sustainable. Optimizing garbage collection routes based on actual disposal unit fill levels—as measured by fill level sensors—is one such application that's proving to be quite impactful. Ultimately, truly transforming waste management will require deeper collaboration between public and private stakeholders.

INTELLIGENT WASTE COLLECTION SYSTEM

The waste collection should equipped with latest technology of IoT system.

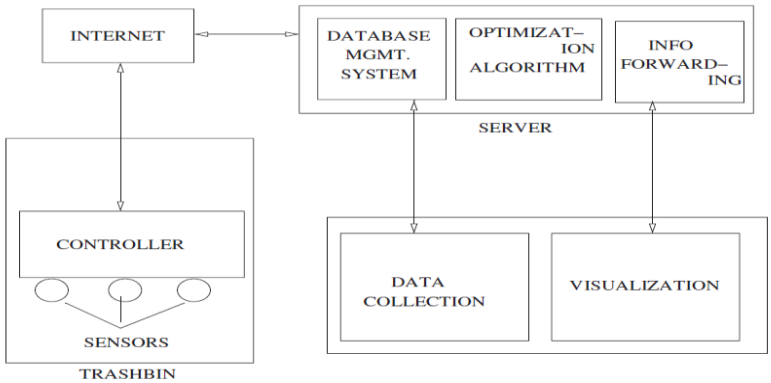

Fig 1. Overview of the structure.

Proper algorithms should be developed to improve efficiency. Algorithms should be of Smart Waste Management Algorithm, Shortest path spanning tree algorithm, Algorithm in waste bins sensors, Analysis algorithm used by the servers. Proper inputs should be developed for getting effective output. Figure 1 shows the overview of the waste management (GopalKirshna Shyam[1])

This method can be used for both collections of liquid and solid wastes from industries.

IOT BASE SMART SOLUTION USING MOBILE

In this method all server is connected with mobile to avoid overflow and also to reduce cost.

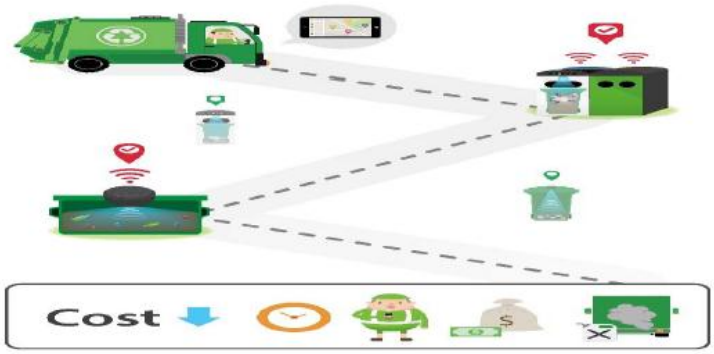

Fig 2.iot Base Smart Solution Using Mobile

This type of inefficiency wastes both time and money and is harmful for the environment but what if there is a better way. Integrated hardware and software solution optimizes waste collection, saving time, money and the environment. The smart bin can be used with wheel bins act as a Wi-Fi hotspot and the clean cap is a pin fill level sensor powered by either battery or solar energy. It can be used with all types of containers such as wheelie bins, large waste containers and even underground bins. It sense how much waste is inside the container and wirelessly transmits fill level information to cloud server.(HimadriNath Saha[2])

IOT VIRTUAL RESOURCE ARCHITECTURAL DESIGN

We define an IoT virtual resource as an abstraction of other resources, virtual or not. The architectural design of the IoT virtual resources is graphically illustrated in Fig. 3.

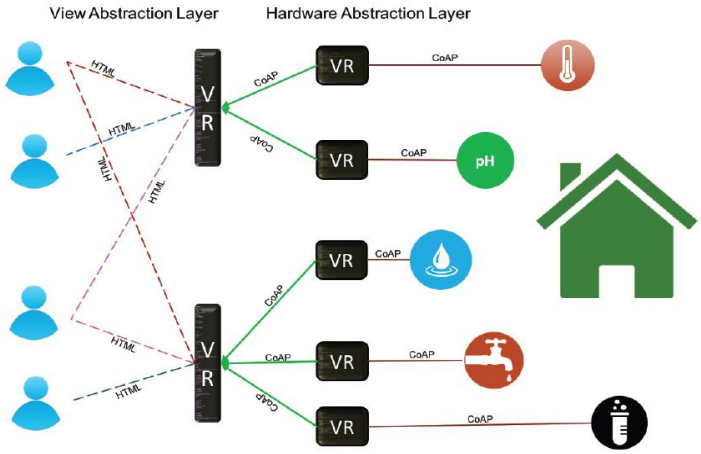

Fig 3. The architectural design of the IoT virtual resources.

The architectural design of the IoT virtual resources. Example of the IoT ecosystem in a green house incorporating the virtual resources. The physical layer represents the sensors working in the environment. The two layers, hardware abstraction and view abstraction, are edge-hosted application middleware's, which are aimed at encapsulating the complex city of access and configuration of physical resources. (Mayra Samaniego[3])

BIOLOGICAL TREATMENT PROCESSES

Organics are biodegradable in nature and thereby have the capacity to generate energy. (Anchal Sharma[4]). Flow charts indicating the preferred pathways or generation of biogas and compost by using the wet fraction and generation of energy using dry waste are shown in Figs. 4 and 5.

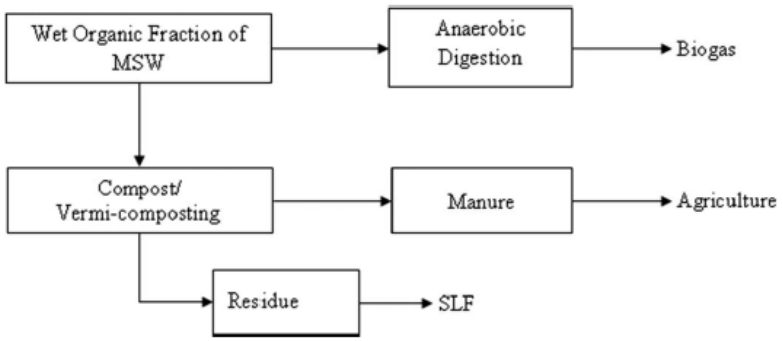

Fig 4. Pathways for generation of biogas or compost using wet waste.

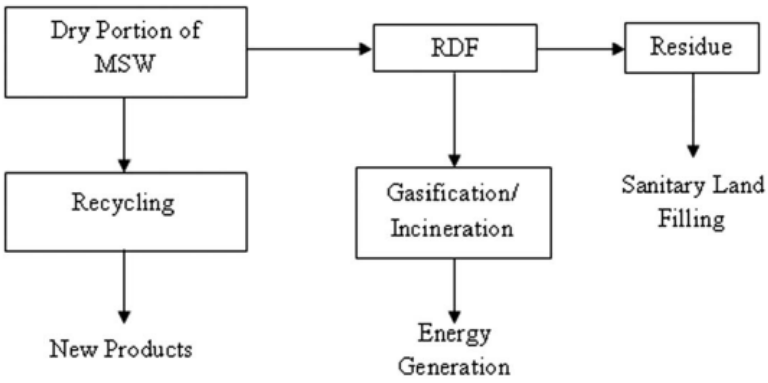

Fig 5. Pathways for generation of energy and new products using dry waste.

CONCLUSIONS

We presented an intelligent waste collection system. The system is based on IoT sensing prototype. It is responsible for measuring the waste level in the wastebins and later send this data (through Internet) to a server for storage and processing. This data helps to compute the optimized collection routes for the workers. Our virtual resource performed in an expected manner, responding to all requests no matter the concurrency level they faced. The characterization analysis of the study regions showed that all locations had a high proportion of organic waste in the MSW generated and hence can act as potential sources of biogas generation.

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Conflict of Interest

None of the authors have any conflicts of interest to declare.