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Article

A Review on Smart Waste Segregation and Management Utilizing IOT

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A B S T R A C T

The Internet of Things(IoT) is a notion in which the interconnectedness is accomplished via the internet of computing devices implanted in daily objects, enabling them to send and receive data. The initial technical realisation of IoT was done by RFID which is used in identification and tracking of devices. Due to the merits and characteristics of IoT, it plays an important role and has its applications in many fields including waste management.

This paper proposes a keen waste isolation framework made from brilliant trash containers, different sensors, programming, and hardware. The isolation of waste assumes an essential function in squander the executives. Fundamentally waste can be partitioned into degradable and further it very well may be isolated into various classifications exposed to assist use. This waste can be exposed to reusing and can be additionally utilized. Waste can be filled in as a source commonly. This paper proposes the compelling asset use by isolating and dealing with the waste.

Keywords: Garbage Segregation, Smart Garbage System, Smart Garbage Bin, Automatic Waste Segregation, Segregating Wastes, Waste Management

Introduction

India's garbage generation is around at 0.2 to 0.6 kilograms of garbage per head per day.[1-8] In recent time, urbanisation has increased and at the same time there is a huge increase in waste production. Waste management has always been a crucial issue to be considered and taken care of.[6]

Segregation becomes exceedingly difficult and at the same time especially crucial in effective waste management.[1-3] Most of the waste generated is in a mix form and therefore it cannot be disposed of as effectively. Generation of huge amount of waste is a disadvantage but by disposing and recycling it for further use it can serve as a great source which can be an advantage.[4,5]

The waste is not subjected to recycling, composting or any other form of environmental treatment which can be further used because of lack of proper waste management.[6] The organic waste lie side by side with hazardous toxic waste in the landfill. Thus, the separation of biodegradable from non-biodegradable waste must be done. After the proper segregation, management plays a crucial role.[4]

Many a times we observe that the bin is filled completely and there is no space to dispose off the garbage. Hence management also must be done along with the segregation of waste. At regular intervals according to the threshold limit of the smart bin the garbage in the dustbin will be squashed by the proper authorities as the smart bin will

send an alert to them. The implementation can be done by using microcontroller, smart bins and GSM modem.[5]

Once these smart bins are execution on a large scale, by replacing our traditional bins present today, waste management can be done effectively as it avoids unnecessary piling of waste on roadside.[6] Foul smell from the unattended rotten garbage may lead to various problems. This may cause harmful diseases.[7]

Statistics

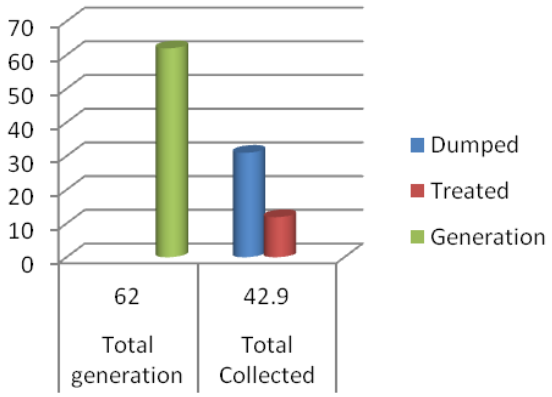

Figure 1.Statistics of Present Waste Management System

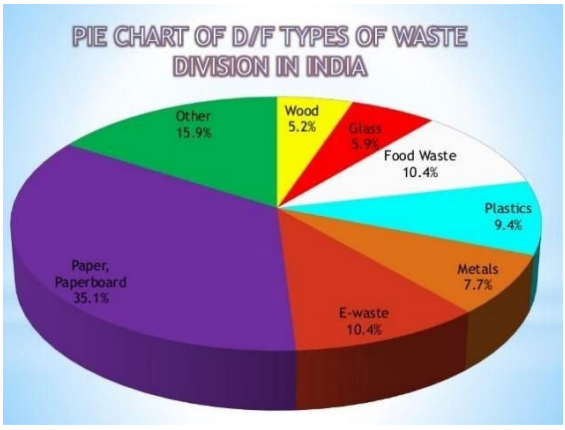

Figure 2.Pie Chart of different types of waste division in India

Aims and Objectives

The aims and objectives are:

- Recognize the problems currently present in the Waste Management System.
- To find the root cause behind it
- Try and give a better and feasible solution to overcome that problem.
- Understand various reasons for wastage coming up with new technology being used.
- Modern method of cultivation is used to cope with growing demand of population.

Requirements

Sensing : Ultrasonic Sensor, Moisture Sensor.
Software : Arduino IDE
Hardware for Segregation : Bipolar Stepper Motor and DC Geared Motor.
Microcontroller : Arduino Mega(ATmega1280).

Basic Working and Components

The paper fundamentally comprises of the accompanying modules:

Translation Mechanism for Input

Detecting Module

Separation Module

Waste is the contribution to this framework which will go through the interpretation mechanism.[4] After this stage it experiences the detecting module.[5] The gear utilized in this component can be a container. It comprises of a compartment which is joined to a stepper engine which is utilized for division. When the item enters the container pivots which makes the info fall on the sensors.

Lets briefly talk about how the model of the hopper can be used for implementation:

The sensors have a limitation about the range of the output and so the sensing plate is kept inclined so that the waste is passed to the sensing module so that it can come within the range of all sensors. The sensing module is surrounded by various sensors used for segregation of dry and wet waste. The sensing plate can be attached to a dc geared motor. The rotation of that motor will cause the dropping down of the object.[4] The rotation is controlled by Arduino microcontroller.

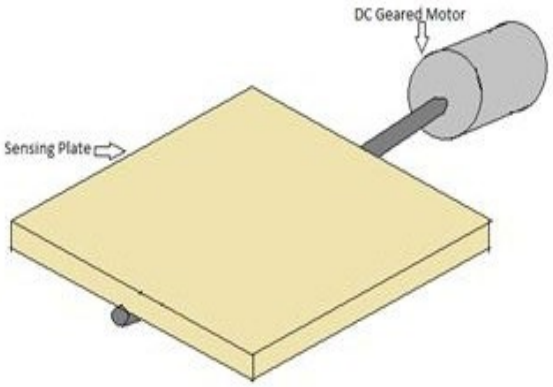

Figure 3.Sensing Plate with DC Geared Motor

Below the sensing module comes the separation module. Its execution is done by using a bipolar stepper motor.[8] The sensing module output is sent to the input pins of the Arduino. Using the logic table type of waste is identified and a step value can be sent to the stepper motor.[5] The step values are such that the stepper motor rotates. Waste

storing bags can be attached to an armature which is fixed on the stepper motor. The armature will rotate in the direction according to the received output.[6]

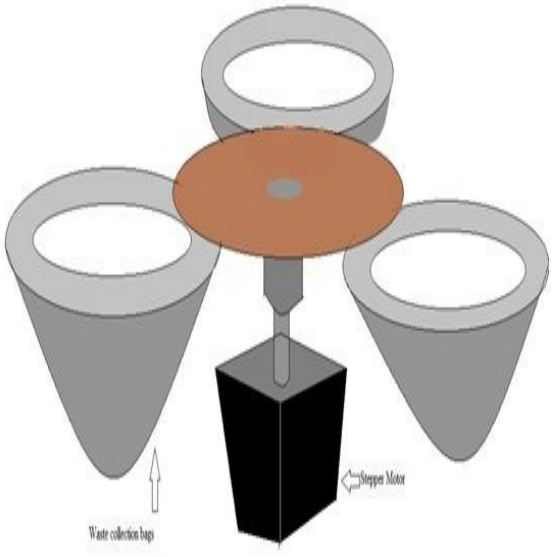

Figure 4.Model for Separation Module

Logic for Separation can be represented by the table shown below:

Figure 4.Model for Separation Module

Ultrasonic Sensor	Moisture Sensor	Decision
1	0	Dry Waste
0	1	Wet Waste

The decision can be taken by this logic table for segregation.[7] In this way the segregation can be done effectively.

Management

After segregating the waste properly, the management of the same is also very important as the one of the main issue is Garbage Overflow.[6] It creates unhygienic condition for the people and creates bad smell around the surroundings which leads to illness and diseases. To avoid it, along with segregation management plays a great role. Implementation is done by using microcontroller, GSM modem and sensors. The sensors attached to the garbage bags is also interfaced with GSM modem.[7] At regular intervals, the garbage can be taken out so that the new bags can be used for efficient waste collection. Once the garbage reaches threshold value, sensors will trigger the GSM modem which will continuously alert the required authorities until the garbage is taken out so that it be reused.[6]

When these brilliant receptacles are actualized by supplanting customary containers for a huge scope , waste can be overseen effectively as it stays away from pointless heaping of waste.[5]

For correspondence reason, Bluetooth can be utilized in the transmitter however GSM has more points of interest over Bluetooth.[4] The following is the Diagram of GSM:

In this way effective management can be done.

Advantage of The Process

There are many advantages of this system:

- Replacement of this waste management system by the traditional waste management system will lead to efficient segregation.
- Dry waste and wet waste will be separated efficiently as it is an automated system.
- In the traditional system the management is poor as the garbage is left unattended.
- Segregation and management in one system save a lot of time and efforts.
- The segregated waste can be used for further processing by recycling, composting according to different categories which varies with the needs.
- Reusing waste is beneficial for economic growth of the country.

Limitations

The disadvantages of this process are:

- Since it is an automated system, errors can take place.
- It requires proper organisation of the equipment's for proper implementation.

Conclusion

This paper focuses on how traditional method failed to meet rising demand of need of the people[5]. By replacing traditional system with this system efficient segregation and management is done with proper implementation. In this process, limitations are also there but compared to advantages it is less. To conclude, the implementation of the proposed system can be used in the efficient segregation and management efficiently.

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