

# A SURVEY ON DRY WASTE MANAGEMENT

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**Abstract:** This collection of paper explores various methodologies for dry waste management. It presents creative solutions to various range of problems. Topics covered in these papers include IoT technology, Deep Learning, Machine Learning, approach. Methodologies approach are described for tasks including classification of solid wastes, trash management, recycling using technologies like Bluetooth and IoT, Arduino microcontroller, Moisture sensor. The research also investigates the effects of dry waste management on the environment and suggests an information architecture. Overall these papers address important challenges in the environment and make a sustainable contribution to efficient and sustainable environment.

**Keywords:** Automatic waste sorters, Satellite units, Automated system, Computer vision, Biodegradable, PET bottles.

## I. INTRODUCTION

Currently, one of the most important issues faced by our nation is waste management. Every year, India generates 62 million tonnes of trash. Waste segregation lowers pollution levels by reducing the amount of waste exposed to air and water, in addition to reducing the amount of waste that is landfilled. Because it lessens the impact of pollutants on the environment and wildlife, waste management is significant. Additionally, it can aid in the reduction or reuse of waste materials that are bad for the environment, like thermocol, glass, plastic, Styrofoam, and many others.

### BENEFITS OF DRY WASTE MANAGEMENT:

- **Resource Conservation:** Breaking down recyclable items including cardboard, paper, plastics, glass and metals is a part of dry waste management. Minerals, oil and forests are just a few of the natural resources that can be preserved by recycling these items.
- **Reduction of Landfill Burden:** Dry waste management lessens the quantity of garbage dumped in landfills by removing recyclables. This lessens the environmental contamination caused due to landfilling.
- **Economic Benefits:** Recycling stimulates employment growth in the trash sorting, collection, processing and manufacturing sectors. By selling recycled materials it also makes money and boosts the local and national economies.
- **Environmental Protection:** Reducing pollution and mitigating environmental deterioration are major goals of dry waste management. Recycling helps lessen habitat degradation and wildlife disturbance brought on by resource extraction, as well as the air and water pollution generated by garbage incineration and landfilling.
- **Community Involvement:** Putting dry waste management initiatives into place fosters environmental awareness and community involvement. Education initiatives about recycling, waste reduction, and appropriate disposal techniques help people and communities feel more accountable to the environment.

**LITERATURE REVIEW**

SL NO.	YEAR	TITLE	DESCRIPTION
1	2023	International Conference on Recent Advances in Electrical, Electronics, Ubiquitous Communication and Computational Intelligence (RAEEUCCI) [1]	The management of plastic garbage has emerged as a critical issue in contemporary civilization, upsetting environmental equilibrium and harming public health. The traditional approaches to waste management and monitoring are labor-intensive, complicated, and demand a large amount of human labor. This research suggests an Internet of Things-based smart waste management system as a solution to this issue. The waste is separated into distinct categories by the system using sensors, including metallic, biodegradable, and plastic waste. Waste is dried and separated over the course of three steps of the segregation process, which makes use of drier modules, load sensors, and ultrasonic and capacitive sensors. Additionally, the device has an Android app that uses Bluetooth and IoT connectivity to monitor data in real-time. The suggested remedy is to lower the rate of plastic usage and produce.
2	2022	IEEE Central America and Panama Student Conference (CONESCAPAN) [2]	Regardless of social and economic circumstances, waste management has been an ongoing issue for many nations. The most vulnerable population has experienced environmental and health issues due in part to the accumulation of waste and improper disposal and segregation. Just 2% of the waste in Honduras is recycled; this is done by lone collectors working in the informal sector, who sort the trash and sell it to the few businesses that specialize in recycling. There is a hidden desire to look for better answers because this approach has been shown to be unproductive. This study suggests using a computer vision system to classify various dry trash, including glass bottles, PET bottles, and aluminum cans. The program's ability to identify waste in real time is the goal.
3	2021	IEEE international Conference on Electronics, Computing and Communication Technologies (CONECC T) [3]	One of the most important problems faced by today's modern towns is municipal solid waste management. Growing populations, building projects, industrial growth, and other reasons are the main causes of the massive volume of waste that is thrown into landfills. For the management of municipal garbage, a number of methods have been developed and are currently in use. These include automatic optical waste sorters, eddy current sensor-based metallic waste sorting, mechanical vibration-based size-based sorters, etc. This study focuses on a novel approach to solid waste segregation that makes use of deep learning and machine vision ideas. Tetra packs, aluminum cans, and plastic bottles are the main materials used in the testing of the suggested concept for the segregation of solid dry trash. The segregation prototype system operates with remarkable accuracy and quickness.

4	2020	Second International Conference on Inventive Research in Computing Applications(ICIRCA) [4]	Cities produce a lot of solid garbage, and this waste is made up of many materials that need to be handled differently for effective waste management, such as organic wastes, paper, plastic, metal, glass, and so on. This suggests that before being treated, the wastes that are disposed of at one location must be divided into different categories. The government established the notion of wet and dry wastes to aid in this process and encourage citizens to dispose of their waste appropriately. Strict adherence to these guidelines will result in significant budget savings for waste segregation, which can then be applied to additional waste treatment. This study can determine whether garbage is dry or wet.
5	2019	International Conference on Computing, Communication, Control and Automation (ICCUBEA) [5]	In the modern era of fast advancing technology, trash is growing exponentially in tandem with the rapid increase in urbanization. As the idea of smart cities gains traction, a suitable framework is required to address this issue. Researchers have made a lot of effort to suggest different ways to get around this problem, yet the issue still exists. The separation of various waste types is the main issue encountered while developing an intelligent garbage collecting and monitoring system. The trash is still being separated by hand, which is damaging to the segregator itself. This study describes an automatic trash segregator system that can distinguish between and store wet and dry waste in various areas.
6	2018	International Conference on Computer and Communication Engineering (ICCCE) [6]	The majority of the world's nations are struggling with a massive waste management system issue. The growing population and fast urbanization are producing enormous amounts of rubbish annually. People's significant concerns about an inadequate waste management system have resulted in disruptions to the environment and public health. This research proposes a completely automated system that can distinguish between recyclable and residual home waste. Using a moisture sensor to distinguish between wet (residual) and dry (recyclable) garbage, it is demonstrated that the prototype system can automatically separate waste into recyclable and residual waste. The percentage of water content and the waste's resistance to current values indicate its condition.
7	2017	International Conference on Computational Intelligence in Data Science (ICCIDS) [7]	A smart city can be characterized by a number of adjectives, including clean, digital, green, intelligent, and many others. In order for the solid waste processing unit to work with other satellite units and waste collectors to take more effective and expedient action, this conceptual paper proposes to establish a gateway for the unit. The portal will allow the unit to access classified information on solid waste. The waste entity is digitally tractable, and uses an algorithmic approach for classification. Waste disposal, recycling, and other related units can use this classified garbage information to clear their waste processing units and receive timely notifications. Generally speaking, there are three types of solid wastes: hazardous, wet, and dry.

8	2016	International Conference on Communication and Electronics Systems (ICCIES) [8]	<p>Cities, continuous economic growth, and industrialization all contribute to a rapid increase in the volume and types of solid waste. According to the Global Waste Management Market, 2.02 billion tons of waste are created globally each year. "If waste is separated as it was, it's not always waste." Waste needs to be handled, separated, transported, and disposed of appropriately to lower threats to public health and the environment. Waste is better understood in its economic context when it is separated. At the industrial level, there isn't currently a method in place to separate garbage made of glass, plastic, and metal. This report suggests automating the scrap industry's waste material segregation process.</p>
9	2022	International Conference on Electronics and Renewable Systems (ICEARS) [9]	<p>In India, 45 million tonnes of waste produced annually are disposed of in an unclean manner, endangering human health and the environment. An effective waste management system is essential in smart cities. This study offers an Internet of Things (IoT) based trash management system that intends to separate waste materials from several streams, including wet and dry, plastic, paper, metal, and glass, in order to address the existing problems. It raises the possibility of recovery and the ensuing procedures for recycling. The Arduino microcontroller, which is used in the implementation of this system, provides easy and straightforward process control. There are several stages in this segregator system: an infrared sensor, an inductive proximity sensor, a raindrop sensor, a photoelectric sensor, and the segregation bins.</p>
10	2022	International Conference on Augmented Intelligence and Sustainable Systems (ICAISS) [10]	<p>The current epidemic wave is making it more difficult to collect medical waste. Unwanted trash is dumped on the periphery of towns and cities, causing harm that cannot be repaired due to overflowing landfills..Furthermore, the current equipment necessities may cause a persistent sickness in the person utilizing it. Among the admirable objectives of the proposed system are the creation of an automated system that will save countless lives and make society greener and cleaner. This research aims to develop an intelligent dry and wet waste separation and management procedure of medical waste material based on the Internet of Things (IoT). It makes use of sensor devices to identify rubbish in dustbins.</p>

11	2021	International Conference on Computational Intelligence and Computing Applications (ICCICA) [11]	Managing waste is one of the most difficult problem faced by the modern society. The substantial amount of waste is a result of the modern lifestyle, rapid population rise, and growing factory presence. The two essential components of an effective waste management system are waste processing and waste segregation. Conventional recycling and reuse of the garbage is made effective through segregation. This research suggests a new and effective automated waste management and segregation system for households. The Arduino microcontroller and Raspberry Pi are used in the development of the suggested system prototype, which allows for easy and comfortable control over the entire process. The sensory unit, which aids in the separation of various waste kinds, is the most crucial component of the suggested system. The module has sensors to identify metal and moisture to classify various types of waste.
12	2023	International Conference for Emerging Technology (INCET)	As a result of ongoing economic development, urbanization, and industrialization, there is a growing challenge for national and local governments to provide effective and sustainable waste management due to the rapid expansion in the quantity and diversity of solid and hazardous waste. Estimates indicate that 2.02 billion tonnes of municipal solid waste were produced globally in 2006, an increase of 7% per year since 2003. (Market Report on Global Waste Management, 2007). Waste management, transportation, and disposal need to be handled carefully in order to lower the danger to the patient, public health and safety, and environmental hazard. Households do not yet have a mechanism in place to segregate their dry, wet, and metallic waste. An automated trash segregator is required to deliver domestic waste straight to a processing facility.

**III. CONCLUSION**

Solid waste management is a crucial procedure for safeguarding the environment and public health. Improper disposal of garbage can have far-reaching and long-lasting implications on the planet's health.

It may lessen our influence on the environment and preserve resources for future generations by putting into practice sustainable waste management techniques, such as waste reduction, recycling, composting, and the use of contemporary landfills and waste-to-energy plants.

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