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EcoBinSense: Smart Waste Management System for Urban Area using IOT & Android

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ABSTRACT: Waste production has increased in both volume and type as a result of ongoing urbanization and industrialization. The Global garbage Management Market Report (2007) estimates that the total volume of municipal solid garbage generated worldwide reached 2.02 billion tons in 2006, a 7% yearly growth since 2003. The ability of national and municipal governments to guarantee efficient and sustainable waste management is hampered by this. Humanity always benefits from technology by making life easier. The improper disposal of rubbish in public areas leads to an overabundance of waste in dustbins, endangering the ecosystem. Waste must be separated, managed, transported, and disposed of properly to reduce risks to the environment and people. Segregation is the best way to maximize waste's economic worth. At the moment, there is no such system in place for household-level separation of dry, moist, and metallic trash. This article offers a creative method for utilizing sensors to transform the waste management system. Dustbin level is tracked concurrently with the use of corresponding automated sensors to achieve segregation. At the household or social unit level, there is currently no such mechanism in place for the separation of dry and moist waste. An automated trash management and segregation system based on sensors is proposed in this research.

KEYWORDS: segregation, automation, management, embedded system technology, dustbin, automated sensors.

I. INTRODUCTION

Garbage disposal has become a major global challenge in recent years. A significant amount of waste is produced and disposed of in ways that negatively impact the environment. Organizing, funding, building, and running facilities for the collection, transportation, reuse, and final disposal of trash are all included in waste management. The most popular way to get rid of waste is to dump it in landfills in an unplanned and uncontrolled manner. This approach harms plant, animal, and human health. In addition to being an unfavourable use, this destructive waste disposal technique can produce liquid leachate that contaminates surface and ground waterways, host disease vectors that spread dangerous diseases, and diminish the aesthetic value of the natural environment.

Rag pickers are crucial to India's urban solid waste recycling process. Workers in conservancies and rag pickers are more likely to suffer from respiratory and skin illnesses. Because it is dependent on the rag pickers, the waste segregation is reduced. At the disposal level, waste segregation could be one way to address this issue. when the waste is divided into several fundamental streams, including dry and wet. There isn't a system in place at the household level to separate dry, moist, and metallic wastes. Only after the garbage is fully recycled does its economic value become apparent.

Waste that is separated into fundamental streams, including wet, dry, and metallic, has a better chance of being recovered and, as a result, recycled and reused. Frequently, the wet waste part is transformed into methane gas, compost, or both. The need for chemical fertilizers can be met by compost, and biogas can be used as a fuel. Both recycling and reuse are options for the metallic trash. Large-scale industrial waste segregators are available, however it is usually preferable to separate the trash at the source. This paper proposes an Automated Waste Segregator (AWS) which is a cheap, easy to use solution for a segregation system at households, so that it can be sent directly for processing. It is designed to sort the refuse into metallic waste, wet waste and dry waste.





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II. LITERATURE SURVEY

Sr. No.	Name of Paper	Publisher	Authors	Year	Description	Algorithm Used
1	A Hierarchical Waste Segregation Using Smart Dustbin	IEEE Access	Nafisa Anjum Antora	2023	A prototype is developed, consisting of mechanism to initial segregation, then image processing and AI is use to further segregate the waste.	LSTM
2	Smart Waste Bin: Mechanical and AI Based Waste Segregation	IEEE Access	Mohammad Zubair	2023	The essential parts of the system of this gadget are the Arduino UNO and ultrasonic sensors. A moisture sensor built inside a microprocessor and a conveyor belt was used to create a smart trashcan for garbage separation in order to identify damp, dry, and recyclable material	YOLO v2
3	Garbage Segregation System with SMART Technology Subtitle as needed	International Conference on Inventive Computation Technologie	D Bhavana; T Raja Rajeswari;	2021	After processing and sorting, the robot divides the garbage into indestructible and nonperishable debris. The goal of this project is to develop a smart garbage classification system based on the internet of things and a deep AI- based learning model.	Yolov3





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4	Design and Implementation of a Smart Bin using IOT for an Efficient Waste Management System	IEEE Access	Swethaa Prabhu	2023	The sensor will send a signal when it detects 7080% filled boxes, which will give them enough time to get to the collection point. Each bin will have its own GPS tracking system to locate its location and also to avoid the hassle of being stolen	CNN
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III. PROPOSED SYSTEM

The initiative to finish waste management is segregation. According to studies, the majority of people in both urban and rural areas find it bothersome that waste is not separated. Waste management or collection comes second. Effective waste management systems include smart alert systems that notify the municipality when rubbish is piled up in the trash can quickly and accurately, depending on the level of garbage filling. In order to manage waste in a community and separate it in the early stages, we suggest a project that uses several sensors and actuators. The primary elements that will be utilized for implementation are indicated in the block and listed below.

A. Arduino Uno microcontroller

Its central component is the Arduino Uno microcontroller. We build the Arduino Uno microcontroller board on top of the ATmega328 (datasheet). A reset button infrared sensor, a USB connector, a power jack, six analog inputs, fourteen digital input/output pins (six of which can be used as PWM outputs), a 16 MHz crystal oscillator, and an ICSP header are among its features



B.Moisture sensor

The Moisture Sensor uses capacitance to measure the dielectric permittivity of the surrounding medium. The amount of water in wet waste determines the dielectric permittivity. The dielectric permittivity and, thus, the water content of the waste determine the voltage that the sensor generates.







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C.Gear motor

The primary purpose of gear motors is to increase torque by decreasing the speed of a set of gears. This is achieved by attaching a gear box or an integrated set of gears to the main motor rotor and shaft via a second reduction shaft. To form what is referred to as a series of reduction gears, the second shaft is then attached to the gearbox or series of gears..



D.Motor Driver

The motor is driven by this increased current signal, which motor drivers act as current amplifiers. Bidirectional drive voltage between 5 and 36 volts is provided by this. It offers protection from extreme temperatures and has a good noise immunity. The Arduino Uno can operate at a maximum voltage of 5V, but the gear motor requires a 12V supply. Therefore, L293D is used to get the necessary 12V.



E. Inductive Proximity Sensor

Metallic objects can be detected without physical contact using inductive proximity sensors. They work on the basis of an oscillator and coil that generates an electromagnetic field in the immediate vicinity of the sensing surface. The oscillation amplitude is dampened when a metallic object (actuator) is present in the operating area. A threshold circuit that modifies the sensor's output detects the rise or fall of such oscillation. The size and shape of the actuator determine the sensor's operating distance, which is closely related to the material's properties.



F.ESP-32

ESP32 is a series of low-cost, low-power system-on-chip microcontrollers with integrated Wi-Fi and dual- mode Bluetooth.







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IV. SYSTEM ARCHITECTURE



V. SCOPE

The scope of smart waste segregation dustbins includes:

- 1. Implementation of IoT technology for efficient waste segregation.
- 2. Integration of sensors for identifying dry, wet, and metal waste.
- 3. Monitoring bin levels and waste types remotely.
- 4. Enhancing user engagement through notifications and data analysis.
- 5. Improving existing waste management infrastructure.

VI. MODULES

Android App for registration and login:- We are creating registration form and login form. Once user register it will store the data into google firebase. Validation on email id,name are done like email id should @ and . symbol. multiple account of same email id cannot be created.

Barchart :-We have created a barchart which will tell different level of the bins. Metal how much it is fill,wet garbage and dry garbage level we can check using barchart.

Hardware :- Using an ESP32 microcontroller for managing dry and wet garbage collection involves building a smart system for garbage segregation, detection, and collection. This system can include features like sensorbased detection of wet and dry waste, automatic notifications for collection, or monitoring the waste levels in bins. Here are the steps for creating a garbage collection system using the ESP32.





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VII. RESULT









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VIII. CONCLUSION

Automated Waste Segregator will be used for the segregation of waste into metallic, dry and wet waste at a domestic level. This system has its own limitations. It can segregate only one type of waste at a time with an assigned priority for metal, wet and dry waste. Thus, improvements can be made to segregate mixed type of waste by the use of buffer spaces. Since, the time for sensing metal objects is low the entire sensing module can be placed along a single platform where the object is stable to ensure better results.

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