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A Review on EcoBinSense: Smart Waste Management System for Urban Area Using IOT and Android

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Abstract: *Continuous urbanization and industrialization has to led to increase in volume and type of waste generated. It is estimated that in 2006 the total amount of municipal solid waste generated globally reached 2.02 billion tones, representing a 7% annual increase since 2003 (Global Waste Management Market Report 2007). This poses a problem for local and national governments to ensure sustainable and effective waste management. Technology always helps mankind in making life easier. In public places, proper disposal of waste is not being followed which causes overflow of waste in dustbins that has become a threat to the environment. Segregation, management, transport and disposal of waste plays an important role to minimize the risk to the public and environment. The economic value of waste is best realized when it is segregated. Currently there is no such system of segregation of dry, wet and metallic wastes at a household level. This paper is an innovative way to revolutionize the waste management system using sensors. Segregation is achieved using respective automated sensors and the level of dustbins are monitored simultaneously. Presently there's no such system for segregation of dry and wet wastes at domestic level or social unit level. This paper proposes an automated sensor based waste management and segregation system. It is designed to sort the refuse into 2 categories: wet and dry (metal).*

Keywords: Segregation, Automation, Management, Embedded System Technology, Dustbin, Automated Sensors

I. INTRODUCTION

In recent times, garbage disposal has become a huge cause for concern in the world. A voluminous amount of waste that is generated is disposed by means which have an adverse effect on the environment . Waste Management includes arranging, financing, development and operation offacilities for the gathering, transportation, reusing and last disposal of the waste. The common method of disposal of the waste is by unplanned and uncontrolled open dumping at the landfill sites. This method is injurious to human health, plant and animal life. This harmful method of waste disposalcan generate liquid leachate which contaminate surface andground waters can harbor disease vectors which spread harmful diseases and can degrade aesthetic value of the natural environment and it is an unavailing use of land resources.

In India, rag pickers play an important role in the recycling of urban solid waste. Rag pickers and conservancystaff have higher morbidity due to skin infections and respiratory problems. The segregation of the wastes are diminished as it depends on the rag pickers. One possible solution for this problem could be segregating the waste at the disposal level itself. When the waste is segregated into basics streams such as wet, dry . Currently there is no such system of segregation of dry, wet and metallic wastes at a household level The economic value of the waste generated is not realized unless it is recycled completely.

When the waste is segregated into basic streams such as wet, dry and metallic, the waste has a higher potential of recovery, and consequently, recycled and reused. The wet waste fraction is often converted into either compost or methane gas, or both. Compost can replace the demand for chemical fertilizers, and biogas can be used as a source of

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energy. The metallic waste could be reused or recycled. Even though there are large scale industrial waste segregators present, it is always much better to segregate the waste at the source itself.

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.

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 Conférence on Inventive Computation Technologie	D Bhavana; T Raja Rajeswari;	2021	After processing and sorting, the robot divides the garbage into indestructible and non-perishable 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
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 70-80% 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

III. PROPOSED SYSTEM

Segregation is the initiative to complete waste management. Studies show that majority of the population in urban and rural areas don't segregate wastes being a reason that they notice it inconvenient. Management or assortment of waste is secondary. There are effective systems of waste management for smart alert system for garbage clearance by giving an alert signal to the municipality for fast assortment of garbage in trash bin with correct verification based on level of garbage filling. Here we propose a project that makes use of different sensors and actuators to manage the waste in a locality and also segregate it in the initial stages itself. The main components that will be used for implementation is as listed below and as shown in the blockdiagram (figure 1) below.

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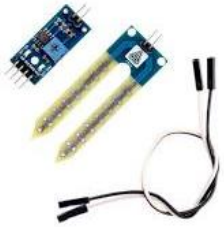
A. Arduino Uno microcontroller

The Arduino Uno microcontroller is the central component of the system. The Arduino Uno microcontroller board is built on top of the ATmega328 and has an ICSP header, a reset button infrared sensor, a USB connector, a power jack, six analog inputs, 14 digital input/output pins (six of which can be used as PWM outputs), a reset button infrared sensor, and a 16 MHz crystal oscillator. This process is used to determine whether the dustbin is filled with trash. An infrared (IR) sensor can detect a single wavelength of light, and it measures the intensity of the light it receives by using an LED that emits light of the same wavelength.

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. Consequently, it is advantageous to differentiate between moist and dry trash. Infrared sensor to measure the level An infrared sensor determines the quantity and presence of trash. This detects and notifies the microcontroller when the level hits a predetermined threshold.



C. Gear motor

Gear motors' main function is to enhance torque by reducing a set of gears' speed. To do this, a second reduction shaft is used to connect a gear box or an integrated set of gears to the main motor rotor and shaft. Then the second shaft is connected to the gearbox or series of gears to create what is called a set of reduction gears. The longer the reduction gear train, the lower the output of the end, or final, gear will generally be. This motor allows the trashcan to rotate both clockwise and counter clockwise and is attached to the main dustbin.

D. Motor Driver

This higher current signal powers the motor, and motor drivers serve as current amplifiers. This provides a bidirectional drive voltage ranging from 5 to 36 volts. It has strong noise immunity and provides protection from harsh temperatures. The gear motor needs a 12V supply, while the Arduino Uno can run at a maximum voltage of 5V. Therefore, to provide the required 12V, L293D is utilized.

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E. Inductive Proximity Sensor

Detecting metallic objects without direct contact is possible using inductive proximity sensors. These devices operate by creating an electromagnetic field close to the sensing surface using an oscillator and coil. In the operational area, the presence of a metallic object (actuator) reduces the oscillation amplitude. Such oscillations are detected by a threshold circuit that alters the sensor's output. The operating distance of the sensor is determined by the size and shape of the actuator and is intimately associated with the characteristics of the material.

F. System Architecture

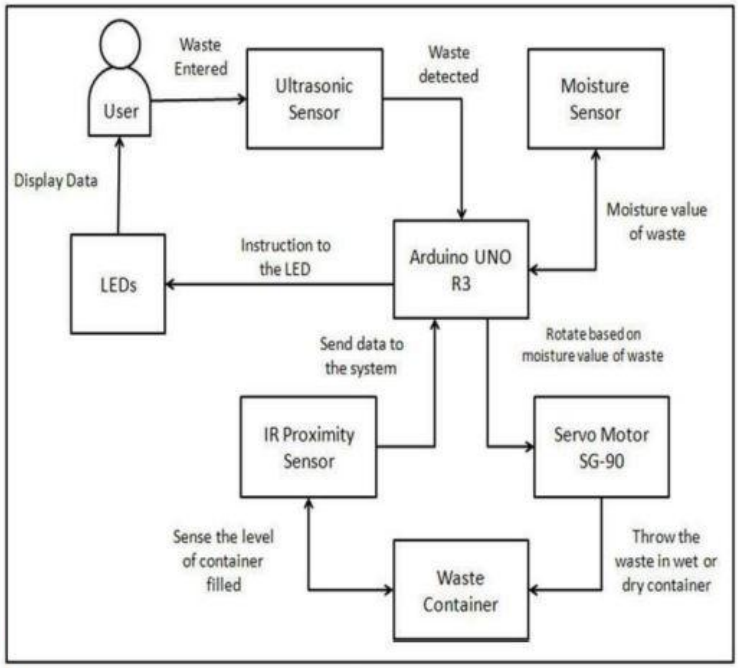

Figure 1. System Architecture

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IV. SYSTEM REQUIREMENTS

A. Software Requirements

- Tools - Android.
- Programming Language - Java.
- Software Version – Java

B. Hardware Requirements

- Moisture sensor
- Metal sensor
- Jumper Wire
- Arduino Uno microcontroller

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.
6. Addressing health and environmental concerns associated with overflowing garbage bins.
7. Providing a scalable solution for smart cities and urban areas.
8. Potential for further innovations, such as self-powering mechanisms like solar tracker

VI. 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 timewith an assigned priority for metal, wet and dry waste. Thus,improvements can be made to segregate mixed type of wasteby the use of buffer spaces. Since, the time for sensing metalobjects is low the entire sensing module can be placed alonga single platform where the object is stable to ensure better results.

REFERENCES

[1]. Daniel Hoornweg et al., "WHAT A WASTE A Global Review of Solid Waste Management", Urban Development& Local Government Unit World Bank, Washington, DC, No.15, Mar. 2012.

[2]. M.K.Pushpa , Aayushi Gupta , Shariq Mohammed Shaikh , StutiJha, Suchitra V,"Microcontroller Based Automatic Waste Segregator", International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering Vol. 3, Issue 5,

[3]. May 2015

[4]. Automated Waste Segregator AmruthaChandramohan, JoyalMendonca, Nikhil Ravi Shankar, Nikhil U Baheti, Nitin Kumar Krishnan* Suma M S RashtreeyaVidyalaya College of Engineering (R.V.C.E.) [

[5]. Nishigandha Kothari,"Waste to Wealth", NSWAI, NewDelhi, Jul. 2013

[6]. InsungHong, SunghoiPark, BeomseokLee, JaekeunLee, Da ebeomJeong, and SehyunPark, "IoT-Based Smart Garbage System for Efficient Food Waste management" - Scientific World Journal-Aug 2014.

[7]. WoikomReshmi, RamkumarSundaram, M Rajeev Kumar, "Sensor Unit for Waste Management: a Better Methodfor Frequent Data Updating System", Nov 2014.

[8]. Álvaro Lozano Murciego, Gabriel Villarrubia González,lberto LópezBarriuso, Daniel Hernández de La Iglesia, Jorge Revuelta Herrero and Juan Francisco De Paz Santana, "Smart Waste Collection Platform Based on WSN and Route Optimization " – 2016.

[9]. Jose M. Gutierreza, Michael Jensenb, Morten Heniusa and Tahir Riazc, "Smart Waste Collection System Based onLocation Intelligence" - 2015.Openlab.com.au