AUTOMATIC DRY / WET SEGREGATOR DUSTBIN

Sarah Shaikh , Subiya Sayyed , Pradnya Kaurav
Department of Computer Engineering ,JSPM Institute of Engineering, Pune , India
Email id:-sarahhh.shk@gmail.com
Guide Name: Mr.S.S.Shende (9021769723)

ABSTRACT: *This paper presents a solution to improper waste management through an automated Dry and Wet Waste Segregation System. Manual waste segregation is often neglected, leading to environmental pollution and difficulty in recycling. The proposed system uses Arduino UNO, Ultrasonic Sensor, Raindrop Sensor, and Servo Motor to automatically separate wet and dry waste. The ultrasonic sensor detects the presence of waste, while the raindrop sensor identifies moisture content. Based on the sensor readings, the Arduino processes the data and controls the servo motor to direct the waste into the appropriate bin. This system reduces human effort, improves hygiene, and promotes smart waste management practices. It can further be integrated with IoT technologies for remote monitoring and data analysis.*

KEYWORDS: *Waste Segregation, Arduino UNO, Ultrasonic Sensor, Raindrop Sensor, Servo Motor, Smart Waste Management.*

1. INTRODUCTION

Improper waste disposal is one of the major environmental problems faced globally. Mixing wet and dry waste makes recycling difficult and increases landfill pollution. Effective segregation at the source is necessary to improve waste management efficiency. The Smart Dry and Wet Waste Segregation System is designed to automatically classify waste based on moisture detection. The system uses sensors to detect waste type and directs it into separate bins. This automated process reduces manual handling and promotes cleaner surroundings. The system can be implemented in homes, schools, offices, and public areas to support smart city initiatives.

2. METHODOLOGY

Methods used to build the model

The system is developed using a microcontroller-based approach. Sensors are used to detect waste presence and moisture level. The Arduino processes the data and controls mechanical movement through a servo motor.

3. MATERIALS AND METHODS

3.1 SOFTWARE AND HARDWARE COMPONENTS

- Arduino UNO
- Ultrasonic Sensor
- Raindrop (Moisture) Sensor
- Servo Motor
- Arduino IDE (for coding and uploading program)
- Jumper Wires (Male–Male and Female–Male)
- Dual Waste Bins

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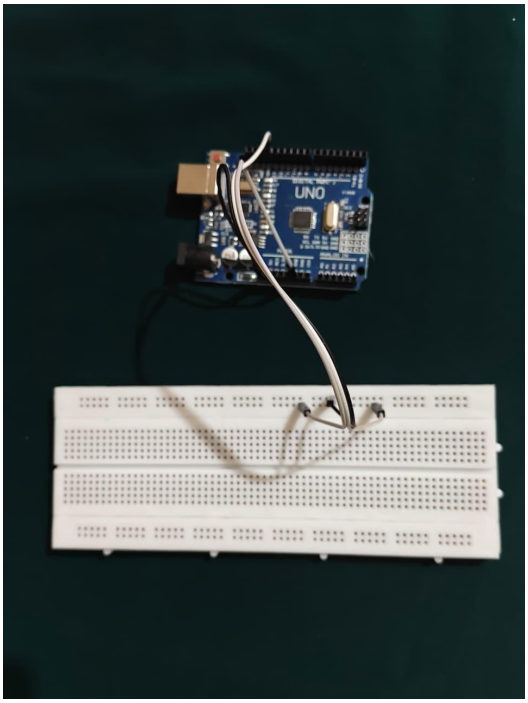
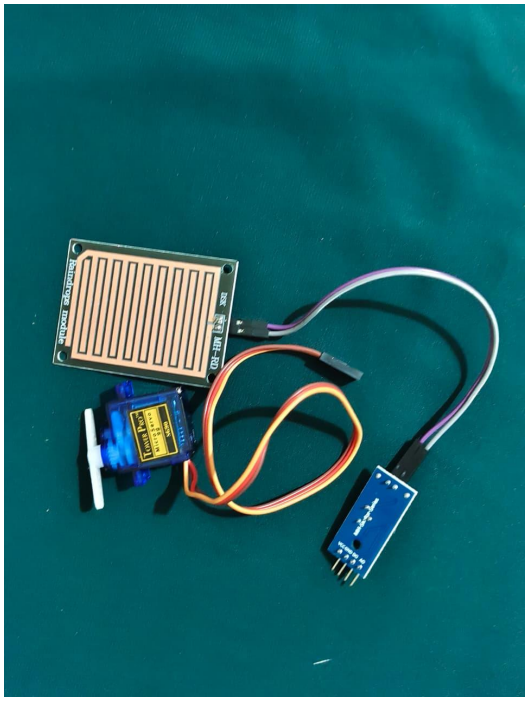
4. System Architecture and Diagram





5.APPLICATIONS

- Smart Homes
- Schools and Colleges
- Offices
- Public Waste Collection Areas
- Smart City Waste Management Systems
- Public Spaces and Events

6.ADVANTAGES OF THE MODEL

- Automatic Waste Segregation
- Reduces Human Effort
- Hygienic and Safe
- Low Cost and Easy Implementation
- Environment Friendly

7.DISADVANTAGES OF THE MODEL

- Sensor Accuracy may vary
- Cannot detect metal or plastic separately
- Requires Proper Maintenance
- Limited to Wet and Dry Segregation Only

8.RESULT

8.1 TESTING AND ACCURACY

The system was tested using different types of dry and wet waste materials. The ultrasonic sensor successfully detected object presence, and the raindrop sensor accurately classified wet waste based on moisture level.

8.2 USER EXPERIENCE AND FEEDBACK

Users found the system easy to operate. The segregation process was automatic and required minimal effort. The system worked efficiently in controlled environments.

9.CONCLUSION

The Smart Dry and Wet Waste Segregation System provides an effective solution for automatic waste classification. By using Arduino UNO and sensors, the system reduces manual effort and promotes proper waste disposal practices. This project contributes toward cleaner environments and supports sustainable waste management. Future improvements can include IoT integration and advanced waste classification methods.

10.REFERENCE

• **General Smart Waste Frameworks:** Kumar and Sharma's work on *"Smart Waste Segregation System Using Arduino"* (2021) is frequently cited for demonstrating automated waste classification using moisture sensors and microcontrollers.

• **Real-Time Waste Monitoring:** Singh and Verma (2020) detail *"IoT-Based Smart Garbage Monitoring System"*, emphasizing real-time monitoring, sensor-based detection, and improved waste management efficiency.

• **Smart City Applications:** Gupta et al. (2019) introduced a *"Smart Waste Management System for Urban Areas"*, focusing on automated segregation and optimized municipal waste handling for smart cities.

• **Microcontroller-Based Automation:** Rao and Patel (2022) proposed *"Automatic Waste Segregator Using Arduino and Moisture Sensor"*, highlighting low-cost hardware implementation for household waste sorting.

•**Books&Articles:** *"Practical Electronics for Inventors"* by **Paul Scherz** (explains sensor circuits and hardware fundamentals). *"Getting Started with Arduino"* by **Massimo Banzi** (covers Arduino programming and hardware integration).