**IoT-Enabled Smart Waste Segregation and Overflow Management System**

**Abstract**

This project introduces a Smart Waste Segregation and Bin Management System aimed at enhancing waste disposal and collection efficiency. The system utilizes sensors to segregate waste into wet, dry, and metal categories. A funnel mechanism, integrated with sensors, detects the type of waste and activates an automated open-close system to direct it to the appropriate bin.

Each bin is equipped with an ultrasonic sensor to monitor its fill level. When the bin reaches its capacity, the system automatically sends an SMS alert with the bin's location to the waste collection truck, ensuring timely emptying and preventing overflow.

By combining sensor technology, automation, and IoT, the project creates an efficient, sustainable, and user-friendly solution for urban waste management, contributing to cleaner environments and smarter cities.

**Existing System**

Existing waste management systems include both manual and semi-automated approaches. Manual segregation involves individuals sorting waste, which is labor-intensive, time-consuming, and prone to health hazards and human error. Semi-automated systems incorporate conveyor belts and basic sensors, but they still require significant human intervention, making them inefficient for large-scale operations. Smart bins with sensors are another solution, utilizing technologies like proximity sensors to automate lid opening and ultrasonic sensors to monitor bin capacity. However, these systems often lack waste segregation capabilities, focusing solely on overflow management. Industrial waste sorting systems in recycling plants employ advanced technologies like optical or magnetic sorting, but they are cost-intensive and unsuitable for decentralized or household applications. Overall, current systems are limited in automation, scalability, and their ability to integrate waste segregation with real-time monitoring and alerts.

**Disadvantages  
Limited Automation:** Many systems rely heavily on human intervention, reducing efficiency and increasing labor costs.

**Lack of Integration:** Current solutions often fail to combine waste segregation with real-time monitoring and alert systems, leading to delays in waste collection.

**High Costs:** Advanced technologies like industrial sorting systems are expensive, making them impractical for residential or small-scale applications.

**Environmental Impact:** Overflowing bins due to inadequate monitoring can lead to pollution and health hazards in urban areas.

**Proposed System**

The proposed system introduces a fully automated Smart Waste Segregation and Bin Management System that addresses the limitations of existing solutions. It uses sensors to categorize waste into wet, dry, and metal types, with a funnel mechanism that opens and directs waste into the appropriate bin. Each bin is equipped with ultrasonic sensors to monitor fill levels, ensuring real-time detection of full bins. When a bin reaches capacity, an SMS notification with the bin’s location is sent to the waste collection truck, enabling timely disposal. The integration of IoT and automation reduces human intervention, enhances efficiency, and minimizes the risk of environmental pollution caused by overflowing bins. This cost-effective and scalable system is designed to improve urban waste management while promoting sustainability.

**Disadvantages**

**Efficient Waste Segregation**: Automates waste categorization into wet, dry, and metal, improving accuracy and reducing manual labor.

**Real-Time Monitoring**: Ultrasonic sensors detect bin capacity, preventing overflow through timely alerts.

**IoT Integration**: Sends SMS notifications with location details for efficient and timely waste collection.

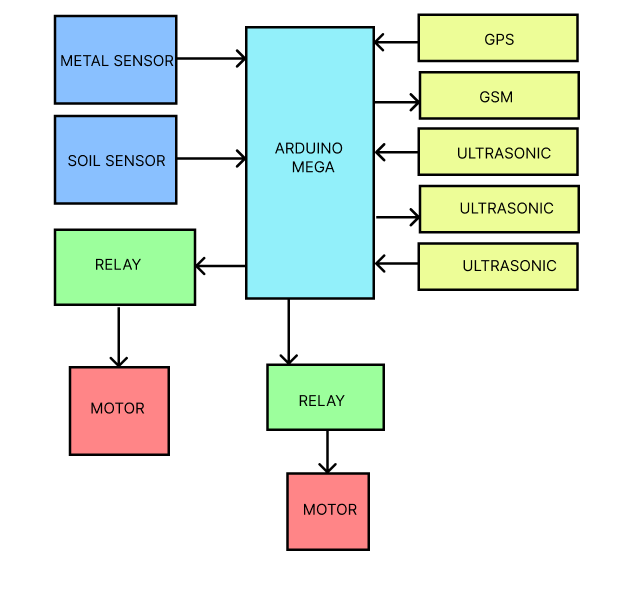
**Environmental Impact**: Prevents pollution caused by overflowing bins, promoting cleanliness and sustainability.

Architecture Diagram

A diagram of a system of sensor

Description automatically generated with medium confidence

**Block Diagram**

****