
**FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING**

**FINAL YEAR PROJECT REPORT
DESIGN AND IMPLEMENTATION OF AN AUTOMATED WASTE
SEGREGATOR BIN WITH GSM MODULE FOR ALERTS**

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This project report is submitted to the department of Electrical Engineering as part of the fulfillment of the requirements for the Degree of Bachelor of Science in Electrical Engineering at Busitema university.

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ABSTRACT

The rapid growth in the population has also led to the surge in the volume of waste being generated on a daily basis. This increase in the generation of waste due to continuous growth in the urbanization and industrialization has become a severe problem for the local and the national government taking a case study of Kampala City in Uganda. It is also posing a serious problem for the local authorities like KCCA to manage the wastes being dumped everywhere as landfill. To ensure the minimal risk to the environment and human health, it is necessary to take careful measures when segregating and transporting waste. Segregation of waste in a proper manner brings to the limelight actual economic value of the waste. The traditional method used for segregating of waste in Uganda is manual segregation which is time-consuming and can have adverse effects on the health of the people who are exposed to such wastes. Here I propose the use of an Automatic Waste Segregator (AWS) integrated with GSM module for alerting waste collectors which is cheap and also an easy-to-use solution for segregation of household waste and time saving.

The system is designed to segregate the waste into three categories that is plastic waste, metallic waste and other waste like paper. It use of capacitive sensor for the segregation of plastic waste, inductive sensor for metallic waste and IR sensor for segregation other waste. The system was tested and evaluated for its performance, accuracy, and successful performed the intended segregation of waste.

Key Terms

Waste Segregation: This is the process of separating different types of waste (organic, plastic, metal, etc.) at the source to facilitate recycling and proper disposal.

Inductive Sensor: A sensor used to detect metallic objects without physical contact.

Infrared Sensor: A sensor that detects non-metallic items such as plastic based on infrared radiation.

Arduino Microcontroller: An open-source electronics platform used to control hardware based on sensor inputs.

IoT (Internet of Things): A network of interconnected devices capable of collecting and exchanging data in real time.

WeMos D1 Mini: A Wi-Fi-enabled microcontroller board based on the ESP8266, commonly used for IoT applications.

Ultrasonic Sensor (HC-SR04): A sensor used to measure distance by transmitting and receiving ultrasonic waves, typically used to monitor fill levels in waste bins.

Machine Learning: A subset of artificial intelligence that enables systems to learn from data and make predictions or classifications.

DECLARATION.

I **Wakhweya Leonard Mulani**, do hereby declare that this project report is my original work and has never been submitted for any other degree award to any other university or institution of higher learning.

Wakhweya Leonard Mulani

Signature 

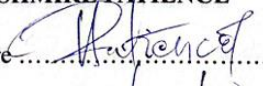
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APPROVAL

This certifies that the project report titled " Design and Implementation of an Automated Waste Segregator Bin with GSM Module for Alerts" was compiled and completed by **Wakhweya Leonard Mulani** under the guidance and supervision of university supervisors. The report is now prepared for submission to the Department of Electrical and Computer Engineering.

UNIVERSITY SUPERVISORS

Ms. TUSHIMIRE PATIENCE

Signature.....

Date.....19/07/2025

Eng. MUGWANYA PATRICK

Signature.....

Date.....20/07/2025

DEDICATION

This project is dedicated to the loving memory of my father, **LATE WAKOBA PETER MUSUNGU GABRIEL**, whose unwavering support, encouragement and sacrifices made my academic journey possible. Your belief in my potential, your constant motivation, and the financial support you generously offered—especially toward my education and this project were pillars of strength throughout my university life. Losing you just before my proposal presentation was a pain I cannot express, but your presence and influence continue to guide me every step of the way. This work is a reflection of your love, and I carry it forward in your honor. Thank you for everything, Daddy. May your Soul continue to Rest in Eternal Peace.

I also offer my deepest gratitude to God, whose grace and strength have carried me through every challenge along this journey.

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First and foremost, I give thanks to God Almighty for His constant guidance, strength, and blessings that have seen me through every challenge encountered during this journey. His grace has been my foundation and source of hope.

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Abbreviations Used

1. AWS – Automated Waste Segregator
2. GSM – Global System for Mobile communication
3. GPS – Global Positioning System
4. IoT – Internet of Things
5. IR – Infrared
6. IDE – Integrated Development Environment
7. DC – Direct Current
8. PWM – Pulse Width Modulation
9. PCBs – Printed Circuit Boards
10. CNN – Convolutional Neural Network
11. RGB – Red, Green, Blue
12. USB – Universal Serial Bus
13. EDA – Electronic Design Automation
14. HC-SR04 – (Model number for the ultrasonic sensor used)
15. ICSP – In-Circuit Serial Programm