

ABSTRACT

Waste management in Indonesia faces significant challenges, with waste volume reaching 21,872,092.95 tons per year in 2021. The existing manual waste sorting system is limited in efficiency and consistency, negatively impacting the environment. This research develops an Internet of Things (IoT)-based Smart Trash Bin system to optimize the automatic sorting of organik and inorganik waste. The system integrates Inductive Proximity Sensors to detect metals, Capacitive Proximity Sensors for non-metal materials, and ultrasonic Sensors to open the trash bin lid and monitor waste volume. The NodeMCU ESP32 serves as the main microcontroller controlling the servo motor to separate waste into the appropriate compartments. An Android-based mobile application is developed to allow users to monitor waste volume and receive notifications in real-time. The research methodology employs a prototyping approach that includes requirements gathering, design, evaluation, coding, and system testing, with the system designed to detect and separate waste sized less than 5cm x 10cm with high accuracy. The research results indicate that the Smart Trash Bin system has the potential to significantly enhance the effectiveness of waste sorting, offering an innovative solution to support more sustainable and environmentally friendly waste management.

Keywords: IoT, Smart Trash Bin, Android, Waste Sorting, Proximity Sensors, Microcontroller