

ABSTRACT

Improper waste segregation remains a major challenge in urban environmental management. To address this issue, this study developed an Internet of Things (IoT)-based Smart Bin system capable of automatically classifying organic and inorganic waste. The system integrates multi-sensor fusion technology, consisting of inductive, capacitive, infrared, and ultrasonic proximity sensors controlled by an ESP32 microcontroller. The detection data are transmitted to the Firebase Realtime Database to support real-time monitoring through an Android mobile application, including a notification feature when the compartment is full. The development method applied was prototyping, covering the stages of design, implementation, and system testing. Test results show that the system achieves a classification accuracy of up to 90% and improves processing efficiency by 80% compared to manual methods, with an average processing time of 2 seconds per item. This system offers a practical solution to support more effective and sustainable waste management.

Keywords: Android Application, IoT, Smart Bin, Sensor Fusion, Real-Time Monitoring, Waste Classification.