

ABSTRACT

Environmental pollution due to the mixing of metal and non-metal waste (e-waste) is a serious issue with widespread impacts on human health, environmental damage, and economic losses. E-waste contains hazardous materials and high-value metals that require special handling to prevent environmental pollution. The lack of early waste separation is one of the main causes of the accumulation of mixed waste, which is difficult to manage effectively.

To address this problem, an automated Internet of Things (IoT)-based waste separator was designed that can differentiate between metal and non-metal waste. This system utilizes the Esp32 as a microcontroller, inductive and capacitive proximity sensors to detect waste types, and servo motors to direct waste to the appropriate receptacles. Additionally, the HC-SR04 sensor is used to measure waste capacity, while the LCD display provides real-time status information.

Test results showed a 70% success rate, with the ultrasonic sensor and IoT module consistently sending full waste notifications via Telegram. Meanwhile, regarding automated waste sorting, this prototype successfully proved its concept with key quantitative test results showing an overall mechanical sorting accuracy of 70% and efficient power consumption. Although its accuracy is not yet optimal, this tool shows good potential for further development as a solution to support intelligent and environmentally friendly automated waste sorting.

Keywords: e-waste, IoT, waste separator, sensor, environment