

ABSTRACT

Environmental pollution caused by the mixing of electronic waste (e-waste) and non- electronic waste has become a serious issue with wide-ranging impacts on human health, environmental degradation, and economic loss. E-waste contains hazardous materials and valuable metals that require special handling to prevent environmental contamination. The lack of early waste separation is one of the main causes of the accumulation of mixed waste, making it difficult to manage effectively.

To address this problem, an automatic waste separator based on the Internet of Things (IoT) was designed to distinguish between electronic and non-electronic waste. The system uses an ESP32 as the main mikrokontroller, inductive and capacitive proximity sensors to detect waste types, and a servo motor to direct the waste to the appropriate bin. Additionally, an HC-SR04 ultrasonic sensor is used to monitor bin capacity, while an LCD provides real-time system status update.

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