

ABSTRACT

Plastic and can waste management has become an urgent environmental issue due to its non-biodegradable nature. This study designs and implements a Reverse Vending Machine (RVM) based on the GM65 Barcode Scanner to scan the barcode of plastic bottles and cans, verify their alignment with a database, and perform automatic sorting. The system is equipped with an ESP32 microcontroller, a servo motor, and a conveyor mechanism to direct the waste into the appropriate containers based on its category, while being integrated with an Android-based application that supports user authentication and provides digital incentives via a cashless payment system.

Testing was carried out on 40 product samples, with 20 scan attempts for each, resulting in an average success rate of 93.3% in barcode reading. Factors influencing the success rate include the physical condition of the barcode, lighting, scan angle, and position on the packaging. The results show that the integration of the GM65 Barcode Scanner with the RVM system works reliably and efficiently in sorting plastic and can waste. This system has the potential to be implemented in public spaces to support recycling programs and enhance public participation through the provision of digital incentives.

Keywords: *Reverse Vending Machine, GM65 Barcode Scanner, Waste Sorting, Cashless Payment, ESP32*