

## ABSTRACT

Waste is the result of human activities, but some waste can merge and blend with the environment. Improperly processed waste can have various impacts on the environment, such as aesthetic degradation, air pollution, soil contamination, and water pollution. Waste is categorized into several types, and one of them is bottle waste, which is a type of waste that is difficult to decompose.

Bottles are commonly used by Indonesian society, particularly in beverage packaging. It is not uncommon to find scattered bottle waste in the environment, improperly disposed of. Therefore, this research aims to create a product that can automatically classify three types of beverage bottle waste: cans, plastic, and glass.

The product to be developed will be able to classify glass and plastic bottle waste based on their sizes and assign a value to the bottles that users deposit into the product, which can be exchanged for credits. The product design involves several electronic components, including Ultrasonic sensors to measure the length of plastic and glass bottles and calculate the maximum height limit for each type of bottle waste, Inductive Proximity sensors to detect metal and non-metal bottle waste, Loadcell sensors to measure the weight of glass and plastic bottle waste, Radio Frequency Identification (RFID) sensors for card recognition and user data. Additionally, Arduino Mega and ESP8266 serve as microcontrollers, and a Servo Motor is used as an actuator to move the disposal and container paths in the product.

The testing conducted on the product yielded excellent data. In the process of sorting bottle waste, the first step is the classification of the bottle waste. Once the bottle waste is classified and placed into their respective containers, the classified data will be sent to a database and can be accessed through the provided website. The results of the product classification testing produced very good data and targets, with an accuracy rate of 100% for plastic bottle sorting, 100% for metal bottle sorting, and 94.12% for glass bottle sorting. This means that all bottle waste can be classified according to their type and size, specifically for glass and plastic bottles.

*Keywords: Bottle Waste, Classification, Sensor, Actuator, Microcontroller*