

## ABSTRACT

The increasing waste problem in Indonesia has become an urgent environmental issue, especially due to the lack of public awareness in sorting waste and limited supporting facilities. Inefficiency in the sorting process causes a decrease in recycling effectiveness and wider environmental pollution. This condition demands innovative solutions that are not only efficient but also able to educate the public. This study aims to design an Internet of Things (IoT)-based waste sorting system that can automatically sort waste into organik, non-organik, and metal categories.

The method used in this study involves a combination of sensors such as proximity sensors (inductive and capacitive), ultrasonic sensors, and *loadcell* sensors, which are integrated through the Arduino Mega 2560 microcontroller and *NodeMCU ESP8266* as a wireless connection. Data from the sensors is sent in real-time to the Firebase database and visualized in an Android application based on *Android Studio*. Algorithm classification is used to identify the type of waste, while *fuzzy logic* is used to determine the capacity status of the trash bin. This system is also equipped with a notification feature to the cleaners when the trash bin approaches maximum capacity.

Based on the test results, the designed automatic waste sorting system is able to work well. This tool successfully carries out its function in detecting, classifying, and combining waste automatically and in *real-time*. The application of various sensors and integration with mobile applications has been proven to support the efficiency of the waste sorting process, while also showing that this technology is worthy of being applied as a solution in smart and sustainable waste management.

Keywords : *Internet of Things*, Arduino Mega 2560, NodeMCU ESP8266, Firebase, Android Studio, *Automatic Waste Sorting Bin*