

ABSTRACT

The increase in population in West Java Province, particularly in Bandung City, has led to a surge in waste volume, with the majority originating from households and consisting of organic waste. Unfortunately, most of this waste ends up in landfills using the open dumping method, which contributes to greenhouse gas emissions and environmental contamination. Composting methods can offer a solution for managing organic waste, but they come with several challenges. The main challenge in managing organic waste in Bandung City is the complexity of the manual composting process, which requires manual monitoring of compost temperature and humidity. This manual process often results in suboptimal composting and is time-consuming.

As a solution, the Dicompos system, based on the Internet of Things (IoT), was developed for real-time automation and monitoring of the aerobic composting process. This system utilizes the PR-3001-ECTHPH-N01 sensor to monitor compost temperature and humidity, as well as actuators for automated control, ensuring that the composting process proceeds according to the target without complicated manual intervention. This technology is designed to facilitate communities in managing organic waste more effectively.

Based on testing, the Dicompos system can optimize temperature during the mesophilic phase 17.8% better than the manual method. The system successfully optimized the temperature and humidity of the aerobic composting process with automatic control, reaching a temperature of 35°C and humidity levels of 40-65%, while also accelerating the thermophilic phase to just 5 days. Utilizing the PR-3001-ECTHPH-N01 sensor, which has an accuracy of 98.18% for temperature, 98% for humidity, and 97.63% for pH, Dicompos has demonstrated its effectiveness in maintaining compost quality, although there is potential for improvement in consistently maintaining temperature and humidity. The system also exhibited stable LoRa connectivity up to a distance of 400 meters, with RSSI values ranging from -72 dBm to -91 dBm, and the API performance was satisfactory with an average response time of 257.142 ms. The functionality of the website and mobile application met 100% of expectations, with user satisfaction levels reaching 90.74% for the website and 91.13% for the mobile application, making Dicompos an effective solution with room for further optimization.

Keyword: Organic Waste, Compost, Aerobic, IoT, Automation