

ABSTRACT

Waste management is a pressing issue that needs to be addressed. Data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (KLHK) in 2022 calculated the total national waste production to be 21.1 million tons, with 7.2 tons of waste not being managed properly. Improperly managed waste can have negative impacts on the environment and surrounding communities, such as pollution, flooding, air pollution, and water pollution. Therefore, a smart solution is needed to address this concerning issue of waste accumulation.

This study aims to develop a waste bank application and design an IoT-based smart waste bin to convert waste into economic value using a mobile application with object detection, enabling the community to efficiently deposit waste according to the object detection method. Additionally, the smart waste bin is equipped with proximity sensors that can detect organic and inorganic waste types, ensuring waste is disposed of in accordance with waste management targets. Data collected from the smart waste bins will be integrated with the waste bank application, enabling monitoring of capacity status and the decomposition of organic waste, thereby assisting the waste bank in managing waste more efficiently. Therefore, this research is important to conduct as an effort to reduce waste accumulation by leveraging advanced technology to engage various stakeholders and make the waste management process more efficient.

Test results show that the integrated waste bank application can monitor the decomposition rate of organic waste and the capacity status of each waste type in real-time and send notifications when capacity reaches a certain limit, as evidenced by a delay value of 22.189 ms and a jitter value of 0.424 ms. These results fall into the “very good” category for delay and “good” for jitter according to TIPHON standards. However, in the testing of the smart waste bin, the results were unable to classify waste with an accuracy rate of only 70% across 50 tests, necessitating efforts to improve the performance of the waste type detection sensor.

Keywords: Application, Waste Bank, IoT, Object Detection, Smart Waste Bin.