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AI-Based Waste Segregation System Phase-1

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Abstract: *Waste segregation is a crucial step toward effective recycling and sustainable waste management. Manual segregation methods are often inefficient, unhygienic, and prone to human error. This paper presents a Phase-1 study and design of an AI-based waste segregation system that focuses on the classification of waste into wet and dry categories using a Convolutional Neural Network (CNN). The proposed approach utilizes image-based analysis, where waste images captured through a camera are processed by a trained CNN model to identify their category based on visual features. An ultrasonic sensor–based detection mechanism and an Arduino-controlled rotating bin structure are conceptually designed to support future real-time automation. The primary objective of this phase is to evaluate the feasibility and accuracy of CNN-based waste classification while maintaining a low-cost and simple system architecture. Hardware integration, real-time deployment, and performance validation are considered as future enhancements. The proposed system aims to provide a foundation for developing an efficient, hygienic, and affordable automated waste segregation solution suitable for domestic and public environments.*

Keywords: *Waste segregation*

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