

Submission Summary

Conference Name	2026 International Conference on Intelligent and Sustainable Electronics & Computing Technologies
Track Name	Track 3: IoT, Artificial Intelligence & Machine Learning
Paper ID	529
Paper Title	AI Driven Robotic Arm For Hospital Waste Handling
Abstract	<p>Hospital waste is often filled with infectious materials that need to be sorted carefully. In many hospitals, workers still sort this waste by hand, which can expose them to contaminants and raises the risk of mixing different types of waste. To tackle these issues, this project aims to develop a compact robotic arm system designed to identify and separate typical biomedical waste items. The system includes an ESP32 microcontroller, an ESP32 CAM module for capturing images in real-time, and servo-powered arm movements for sorting physically. We trained a YOLOv8 object detection model with an annotated dataset from Roboflow, which we then implemented on Google Colab to recognize four types of waste: gloves, masks, syringes, and cotton waste, enabling on-device inference. The mechanical design and movement planning were done using Fusion 360 and CoppeliaSim, and we checked the initial circuit behavior with Proteus simulations. The prototype can accurately detect and classify biomedical waste even when they appear in heap arrangements. The detected item is then sorted into appropriate color coded biomedical waste bin using servo-driven pick-and-place motions, allowing contact-free waste handling in a small and low-cost setup. Overall, this system offers a practical solution for safer handling of biomedical waste and shows how affordable embedded hardware and lightweight AI models can enhance hygiene and automation in hospital settings.</p>
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Primary Subject Area	AI for Healthcare, Smart Cities & Industry 4.0
Secondary Subject Areas	AI and IoT Integration
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