Buildathon 2025
Samriddh Bharat
Team: Sandhaaranam

Smart Waste Collection Robot

Revolutionising urban sanitation through AI-powered robotics for Indian cities

DAV School, Pallikaranai

Team Members:

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The Urban Waste Crisis in India

THE PROBLEM

1

Labor Intensive

80 lakh people employed in India

2

Lack of proper segregation

Valuable materials end up on landfills

3

Health and Safety

Workers are exposed to toxic wastes without any safety equipment

OUR SOLUTION

1

Reduces Human Effort

Requires minimal human supervision

2

Better Segregation

Segregates waste at source leading to better recycling

3

No Direct Exposure

Humans are not exposed to the toxic waste which may lead to diseases

Core Technology

Advanced Visual Recognition

A camera array captures live environmental data, processing images at 30 frames per second to identify objects in real-time

Deep Learning Classification

Neural networks trained on thousands of images distinguish between everyday objects and waste items with 90% accuracy. custom deep learning AI model using a dataset from Indian Sources.

Trash vs. Non-Trash Detection

Sophisticated algorithms prevent the robot from collecting personal items, street furniture, or living creatures while focusing on actual waste

Intelligent Waste Segregation System

Material Identification

Computer vision analyzes material composition, texture, and properties to determine recyclability

Smart Routing

A vacuum system sucks the items into a separation chamber, where based on classification results, it is pushed into the correct compartment

Segregated Storage

Two independent compartments maintain separation throughout collection cycle

Recyclable

- Plastic bottles, containers, and packaging materials
- Aluminum cans and metal scraps
- Paper products, cardboard, and newspaper
- Glass bottles and jars
- Food waste and organic matter

Non-Recyclable

- Composite packaging with multiple materials
- Soiled paper products

Highlight Features

Operating in urban environments requires extreme safety mechanisms and outstanding features to protect both the robot and the public it serves, while also maintaining efficiency

Capacity Monitoring

Ultrasonic sensors mounted inside storage compartments measure fill levels, triggers alerts at 90% capacity. Audible and visual warning signals

Advance Object Avoidance

Real-time path planning adjusts routes around pedestrians, street vendors, parked vehicles, and construction zones without compromising collection efficiency.

Hazardous Material Detection

Chemical sensors and visual recognition identify dangerous items like batteries, medical waste, and toxic substances, which are flagged for specialized handling.

Thank You