



## "ENVIRONMENTAL FRIENDLY REVERSE VENDING MACHINE GREEN-O-MATIC"

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### Abstract

The escalating accumulation of plastic and metal bottle waste poses a significant threat to the environment, resulting in pollution, disruption of ecosystems, and health risks. Conventional waste disposal methods have proven ineffective in tackling this growing issue.

The lack of awareness, inefficient recycling practices, and limited user engagement all contribute to the persistent problem of improper disposal and recycling of plastic and metal bottles. Additionally, existing recycling systems often lack the necessary user motivation and transparency, impeding active participation in recycling initiatives.

Because there are often no incentives for users to recycle, waste management organizations find it difficult to optimize the collection and recycling processes. This is because they lack data-driven insights and real-time monitoring. Therefore, there is an urgent need for creative and astute solutions that encourage people to recycle responsibly. For the purpose of precisely identifying and authenticating plastic and metal bottles, the suggested solution should make use of cutting-edge innovations such as the Internet of Things (IoT) and artificial intelligence (AI).

It should also have an easy-to-use interface and provide instant rewards to users who successfully recycle. The ability to monitor waste levels in storage tanks in real-time is crucial for timely disposal and overflow prevention. It is essential to create an Environmentally friendly reverse vending Machine "Green-o-matic" in order to overcome these obstacles.

Waste from plastic and metal bottles could be efficiently identified, rewarded, and managed by this creative system.

By putting such a solution into practice, the objective is to create an interactive and sustainable recycling ecosystem that actively involves users, increases environmental awareness, and makes a substantial contribution to the reduction of plastic waste.

### Introduction

- The smart reverse vending machine is an innovative solution for recycling and sustainability.
- It encourages individuals to actively participate in the recycling ecosystem.
- The way we handle plastic bottles causes harm to the environment. When we don't dispose of them properly, they end up polluting our land and water, hurting plants and animals.
- To resolve this issue to some extent we have made an reverse vending machine.
- This system when applied on large scale can reduce the plastic bottle waste on the large scale.

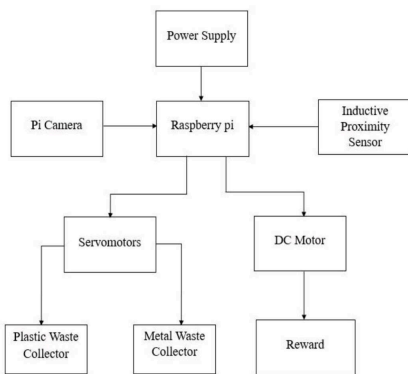


Figure 1: System Architecture

### Objective

- 1.Reduce Contamination :** The machine aims to reduce contamination in recycling streams by accurately identifying and sorting different types of recyclable materials.
- 2.Behavioral Change :** The machine aims to instill a positive behavioral change in individuals by associating recycling with immediate rewards
- 3.Waste Reduction :** These machines aim to reduce litter and waste by facilitating the proper disposal of recyclable materials like plastic bottles and aluminum cans.
- 4.Environmental Impact :** By promoting recycling, smart RVMS aim to reduce the environmental footprint associated with the production and disposal of single-use containers.

### Methodology

- a. Physical Machine:** The reverse vending machine is a physical device where users can deposit their recyclable items.
- b.AI Recognition :** The machine uses AI-based computer vision to identify and sort the items being deposited.
- c. Integration with Recycling Facilities:** Collected recyclables can be automatically sorted and sent to recycling facilities for processing.
- d.Reward System:** To encourage recycling, the machine can offer rewards to users.

### Results

- The implementation of an environmentally friendly reverse vending machine for plastic bottle waste, utilizing AI and Raspberry Pi technology, yielded promising results.
- Through efficient sorting and recognition capabilities enabled by AI, coupled with the cost-effectiveness and accessibility of Raspberry Pi, the system effectively incentivized recycling while streamlining the process.
- Users were encouraged to adopt sustainable habits, contributing to a reduction in plastic waste and environmental degradation.
- Overall, this project demonstrated the potential for innovative solutions to address pressing environmental challenges, paving the way for a greener future.



Fig. Testing

### Conclusion

The proliferation of plastic and metal bottle waste poses a significant environmental challenge, contributing to pollution and resource depletion. Conventional recycling methods often suffer from inefficiencies and contamination issues, requiring a more sustainable and efficient approach to waste management. The "Green-o-matic" integrates AI and IoT technologies to create an automated and intelligent recycling system. Key features include AI-powered recognition to accurately sort plastic and metal bottles, IoT sensors for real-time monitoring of user interactions and waste collector fill levels, and a user-friendly interface that incentivize recycling.

### References

- [1] N. Kokoulin, A. I. Tur and A. A. Yuzhakov, "Convolutional neural net- works application in plastic waste recognition and sorting" 2018 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus), Moscow and St. Petersburg, Russia, 2018, pp. 1094-1098, doi: 10.1109/EIConRus.2018.8317281.
- [2] Gaurav Pawar<sup>1</sup>, Abhishek Pisal<sup>2</sup>, Ganesh Jakhad<sup>3</sup>, Godson Koithodathu<sup>4</sup>, Prof. Piyush G.Kale<sup>5</sup> "RASPERRY PI BASED AUTOMATED WASTE SEGREGATION SYSTEM" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 10 — Oct 2018 [www.irjet.net](http://www.irjet.net) p-ISSN: 2395-0072
- [3] Olugboja Adedeji, Zenghui Wang "Intelligent Waste Classification System Using Deep Learning Convolutional Neural Network" 2nd International Conference on Sustainable Materials Processing and Manufacturing (SMPM 2019)