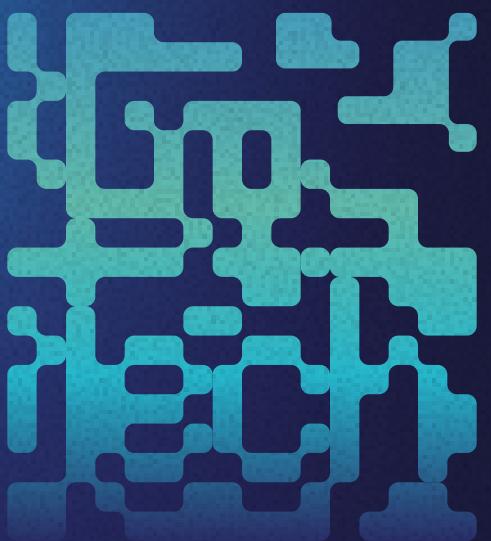




KRITI'25

Smart Disposal Machine

Organizer :
Robotics Club



High Prep
| 600 Pts

Smart Disposal Machine 600 Points

Start : 10/01

End : 04/02

The Challenge

There are significant challenges in waste management across various institutions like universities, railway stations, airports, etc. The conventional dustbins require frequent manual inspections to determine fill levels, leading to inefficiencies in collection schedules, overflowing bins in high-traffic areas create unsightly and unhygienic conditions, while the handling process expose maintenance staff to unsanitary environments.

Recognizing the need for a smarter, cleaner, and more efficient solution, we require you to design and develop a **Smart Disposal Machine (SDM)**. This advanced waste management system would eliminate inefficiencies, prioritize hygiene, and integrate seamlessly into modern operations.

Goals for the Smart Disposal Machine (SDM)

1. Smart Monitoring and Notification:

Include sensors to monitor fill levels in real-time and notify personnel or automated systems when bins are full.

2. Hygienic Operation:

Minimize user and staff exposure to unsanitary conditions during usage and maintenance.

3. Extended Operational Time:

Design the machine to extend the time between trash retrievals by using innovative mechanisms such as compaction or additional storage slots.

4. Automation and IoT Integration (Optional):

Provide remote monitoring (App) capabilities and enhanced automation to reduce human intervention.

5. Waste Segregation (Optional):

Automatically classify waste into categories like biodegradable, recyclable, and non-recyclable.

Functional Requirements:

1. Size Constraints:

- The SDM should have dimensions between 30×30×30 cm (minimum) and 50×50×50 cm (maximum).
- The shortest side must not be smaller than 30 cm, and the largest side must not exceed 50 cm.

2. Fill Level Monitoring:

- Use real-time sensors (e.g., ultrasonic or infrared) to detect trash levels.
- Ensure accurate detection, even with irregular trash placement.

3. Hygienic Handling:

- Include features to ensure minimal physical contact during trash disposal and maintenance.
- Develop an ergonomic design for easy emptying and cleaning.

4. Notification System:

- Provide status alerts via LEDs or a mobile application to indicate:
 - a. Current trash level (e.g., empty, half-full, full).
 - b. When maintenance is required.

5. Optional Features (Bonus Points):

-Waste Segregation:

Use sensors (e.g., IR, metal detectors, and moisture sensors) to classify waste into biodegradable, recyclable, and non-recyclable categories.

-IoT Connectivity:

Enable real-time monitoring via Wi-Fi or Bluetooth and integrate with a web/mobile app to show fill levels, retrieval schedules, and machine status.

-Autonomous Systems:

Add features like an autonomous packing system or a expandable storage slot to increase trash capacity further.

Submission and marking scheme(Total 150 points)

1. Detailed Report Submission(50 points)
2. Final Prototype Demonstration(100 points).

Marking scheme for finals:

Category	Weightage	Details
Core Design and Dimensions	10	Adherence to size constraints (30×30×30 cm to 50×50×50 cm) and efficient use of available volume
Fill-Level Monitoring	20	Use of real-time sensors with high accuracy in detecting trash levels, even in irregular placements
Hygienic Operation	15	Features that minimize exposure to unsanitary conditions and ensure easy handling and cleaning.
Notification System	15	Clear and efficient notification methods for bin status, including LEDs or a simple app interface.
Innovation and Additional Features	10	Unique features like autonomous packing systems, expandable storage, or other innovations beyond the required specifications
Operational Efficiency	20	Extended time between retrieval requests and minimal human intervention.
Presentation and Documentation	10	Clear and comprehensive documentation of design, features, and implementation details.
Waste Segregation (Bonus)	10	Integration of waste segregation using sensors for categories like biodegradable, recyclable, and non-recyclable materials.
IoT Integration (Bonus)	10	Connectivity for remote monitoring and control, such as integration with a mobile/web app to display fill levels and retrieval schedules.

***Note - Details on report format and submission will be shared later.**

Deadlines-

- 1. Report Submission - 04/02/2025 11:59pm.**
- 2. Presentation and prototype demonstration - 07/02/2025**

ALL THE BEST