UNIFIED RE VENDO-MATIC

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Patent Filing Details:	
Start-up:	

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2. Abstract:

The improper disposal of plastic bottles poses a serious threat to the environment, contributing significantly to pollution and waste management issues. To address this, our project presents a Reverse Vending Machine (RVM) that encourages recycling through automation and reward-based incentives. Users can deposit used plastic bottles into the machine, which uses a combination of IR sensors, ultrasonic sensors, and a microcontroller (such as Arduino or Raspberry Pi) to detect and validate the bottle. Once accepted, the machine generates a coupon, which can be redeemed for discounts or benefits at partnered outlets, thereby motivating environmentally responsible behavior. The bottles are stored internally for later collection and

3. Introduction:

Plastic waste, especially from bottles, has become a major environmental concern due to its non-biodegradable nature. Traditional waste management systems often fail to encourage proper disposal and recycling. To tackle this issue, a **Reverse Vending Machine (RVM)** offers an innovative solution by allowing users to deposit plastic bottles in exchange for a reward coupon**.** The machine identifies and collects the bottles using sensors and a microcontroller, making the process automatic, efficient, and user-friendly. This encourages responsible disposal behavior and supports large-scale plastic recycling efforts in public, commercial, and educational spaces.

4. Problem Definition:

Plastic bottles are often disposed of improperly, leading to environmental pollution. Existing systems lack user motivation for recycling. There is a need for an automated solution that encourages proper disposal by rewarding users. This project aims to develop a Reverse Vending Machine that collects plastic bottles and issues a coupon in return.

5. Objectives:

1. To develop an automated system that detects and collects plastic bottles.
2. To provide a **coupon reward** to users for each valid bottle deposited.
3. To encourage proper plastic disposal and promote recycling habits.

6. Methodology (Technology & Innovation):

- **Bottle Insertion**: The user inserts a plastic bottle into the input slot of the machine.
- **Detection & Validation**:
  - **IR sensors** or **ultrasonic sensors** detect the presence and size of the object.
  - The microcontroller (e.g., **Arduino** or **Raspberry Pi**) checks if the object is a valid plastic bottle.
- **Acceptance & Collection**: If valid, the machine activates a **motor mechanism** (like a conveyor or flap) to direct the bottle into the storage bin.
- **Reward Generation**: Once the bottle is accepted, the system generates a **coupon** (either printed or displayed via LCD).
- **System Control**: The entire process is managed by embedded programming (C/Python) running on the microcontroller.
- **Power Supply**: All components are powered through a **regulated DC power source** ensuring stable operation.

7. Design/Implementation:

- **Frame and Structure**: A compact and durable body is designed using lightweight metal or plastic to house all components securely.
- **Input Slot**: A slot is provided for users to insert plastic bottles, guided by a funnel-like structure to ensure proper alignment.
- **Sensor Integration**:
  - **IR sensor**: Detects the presence of the bottle.
  - **Ultrasonic sensor**: Measures the size to confirm it's a valid plastic bottle.
- **Controller Unit**: An **Arduino Uno** (or Raspberry Pi) is programmed to control the logic, handle sensor data, and trigger actions.
- **Bottle Handling Mechanism**: A **servo or DC motor** activates a flap or conveyor to direct accepted bottles to the internal collection bin.
- **Coupon Dispensing**: A **thermal printer** or **LCD display** is used to issue a coupon or code once the bottle is validated.
- **Power Supply**: A **regulated 12V/5V DC supply** powers all electronics safely.
- **Enclosure for Storage**: A collection bin inside the machine stores all accepted plastic bottles for later recycling.

8. Prototype Snap-shots:

9. Results:

The Reverse Vending Machine successfully detected and accepted plastic bottles using sensors. Upon validation, it stored the bottle and issued a reward coupon. The system worked smoothly during testing, and users found it easy to operate, effectively encouraging recycling behavior.

10. Conclusion:

This project demonstrates an effective and user-friendly method for plastic bottle recycling. The Reverse Vending Machine not only automates the collection process but also motivates users through a coupon reward system. It contributes to environmental sustainability and can be installed in public places to reduce plastic waste efficiently.

11. Market demand and Future Scope:

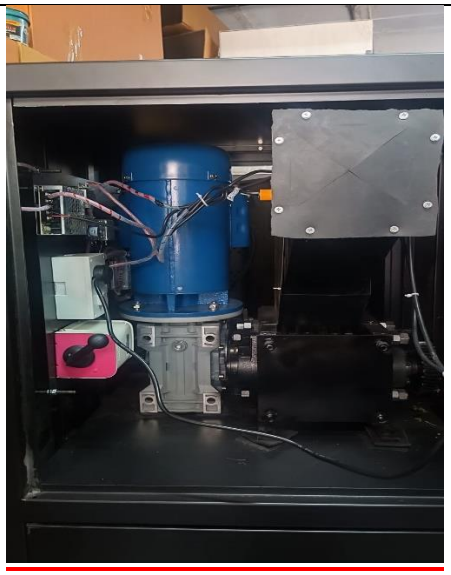
Market Demand:

- With rising awareness of plastic pollution, governments and companies are seeking smart recycling solutions.
- Malls, railway stations, schools, and corporate campuses show high demand for such machines.
- Incentive-based systems attract more user participation compared to traditional bins.

Future Scope:

- Integration with **mobile apps** to track rewards and bottle count.
- Use of **AI/ML** to better detect different types of plastics.
- Expansion to accept **metal cans** and **glass bottles**.
- Solar-powered version for eco-friendly, off-grid use.
- Tie-ups with retail stores or eco-points systems for digital coupon redemption.

Glimpses of Project Implementation



Project Team Group Photo with Prototype