WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Water ATM with Bottle Dispenser: A Sustainable Solution to Plastic Pollution

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ABSTRACT :

Plastic waste, particularly from disposable water bottles, is a growing environmental crisis. With over 70% of these bottles never reaching recycling facilities, the need for innovative solutions is imperative. This paper introduces a Water ATM with Bottle Dispenser, a system designed to provide reusable water bottles and affordable water refills. By utilizing technologies like RFID-based payment and STM32 microcontrollers, this solution addresses environmental and usability challenges. The proposed system reduces plastic waste, promotes sustainability, and enhances user convenience.

Keywords: Water ATM, Plastic Pollution, Reusable Bottles, RFID Payment, Sustainability

1.Introduction :

Plastic waste has become a pressing global challenge, with disposable bottles constituting a significant portion of non-biodegradable waste. Current water dispensing systems fail to address this issue due to limited functionality and reliance on single-use containers. To counteract these problems, we propose a **Water ATM with Bottle Dispenser**, a system that combines affordability, ease of use, and environmental benefits.
This system provides travelers with the option to refill water or obtain reusable bottles for long-term use, significantly reducing reliance on single-use plastics.

2.Problem Statement :

- Over 45% of non-biodegradable waste consists of plastic bottles and caps.
- Approximately 70% of plastic bottles never make it to recycling facilities.
- Existing Water ATMs lack integrated bottle dispensing or cashless payment options.
- The proposed Water ATM addresses these gaps by providing a complete, sustainable solution.

3.System Design and Methodology :

3.1 Components

The system consists of the following components: • STM32 Controller: Core for managing system operations. • RFID Scanner: Facilitates cashless payment via RFID cards. • Solenoid Valve: Controls water flow into bottles. • Flow Sensor: Ensures accurate water quantity dispensing. • Coin Module: Allows coin-based payment for users without RFID cards. • Bottle Dispenser Mechanism: Dispenses reusable bottles in two capacities (500 ml and 1 liter).

3.2 Workflow

1. **User Interaction**:
   - Users select the desired water quantity (100 ml to 1 liter) via a keypad.
   - System calculates the cost (Rs.1 to Rs.5).

2. **Payment Processing**:
   - Users can pay using coins or RFID cards (preloaded).

3. **Water Dispensing**:
   - The system checks for bottle placement before dispensing water to avoid spillage.
   - Flow sensors monitor water volume for accuracy.

4. **Bottle Dispensing**:
   - Users without a bottle can purchase a reusable one. The mechanism uses motors to dispense bottles efficiently.

3.3 System Architecture

The Water ATM uses a modular design with interconnected hardware components controlled by an STM32 microcontroller.

4.Advantages :

1.Environmental Benefits:
- Significant reduction in single-use plastic waste. • Promotes the use of reusable bottles for up to 3 years.

2.Cost-Effectiveness:
- Affordable water refills (Rs.1–Rs.5 per liter). • Eliminates reliance on costly packaged water.

3.User Convenience:
- Cashless payment options through RFID cards.
- Availability of reusable bottles for users without containers.

5.Results and Discussion :

The prototype of the Water ATM was tested in simulated environments. Key observations include:
- Efficient and accurate water dispensing.
- Bottle dispensing mechanism operated with minimal error.
- High user satisfaction due to affordability and ease of use.

6.Conclusion :

The proposed Water ATM with Bottle Dispenser demonstrates a sustainable and practical solution to address plastic waste. By incorporating innovative technology and user-friendly features, this system promotes environmental conservation and offers an affordable alternative to packaged drinking water.

7.REFERENCES :

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