WWW.IJRPR.COM

International Journal of Research Publication and Reviews

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

Sthree – Women's Hygiene Hub

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Abstract:

"Sthree – Women's Hygiene Hub" is a sophisticated vending and disposal machine that encourages menstrual hygiene in public places. It dispenses a pad with the push of a button, and authenticated disposal is available via RFID access. Smoke released after incineration of used pads is filtered with a carbon filter and exhaust fan, rendering it safe. For each disposal, users receive credit points which can be redeemed at the college's stationery shop. They also receive bonus points for returning unused pads. The system features automatic monitoring of stock levels and alerts for refills, thereby guaranteeing availability. This project promotes hygiene, safety, and sustainability in a compact shape which is easy to use.

Keywords— Sanitary napkin vending, Incineration, RFID authentication, Menstrual hygiene, Smart hygiene system, Automated disposal, Credit point system, Carbon filter, Exhaust fan, Stock monitoring, Refill alert, Eco-friendly, Waste management, Hygiene automation, Public health, College utility integration, Sustainable design. Introduction

I. INTRODUCTION

Menstrual hygiene is a critical component of women's health and wellness. Unfortunately, in most public and institutional settings, there is still limited access to proper sanitary products and safe disposal methods. To respond to this, 'Sthree –Women's Hygiene Hub' has been designed as an advanced automated vending system that dispenses sanitary napkins, and enables eco-friendly disposal. The system improves user satisfaction by enabling the dispensing of a napkin when a user presses a button, which provides access during emergencies. For disposal, the user scans her RFID card to unlock the incinerator chamber containing the disposable napkin holder which can be opened to deposit and burn the used napkin. The system contains exhaust fans and filters to control smoke to ensure no possible air contamination. A credit point system rewards users with points redeemable at the college stationery store for every successful disposal which is intended to promote responsible waste management. In addition, the automated supply monitoring system alerts users when the supplies are depleting which guarantees continued supply. This project blends medicine, technology, and the environment as it seeks to empower women by using the hygienic care systems that are easily accessible, safe, environmentally friendly, and convenient.

II. LITERATURE REVIEW

New developments involving menstrual hygiene systems have relied upon the combination of vending and disposal systems to give emphasis to accessibility and hygiene. Aditi Jain et al. (2023) introduced a vending machine equipped with an RFID tag and a coin access system alongside an incinerator. The "Sthree – Women's Hygiene Hub" takes a step further by incorporating both USN-based user authentication, a reward system, smoke filtration, and automated stock alerts for better user utility Shreeshayana R and Simrah Fathima (2021) presented RFID based vending machine along with rudimentary disposal capabilities. Sthree, on the other hand, supplements credit incentives and live updates to promote responsible use in school environments. Rutuja Gaikar et al (2023) concentrated on inexpensive, hand-operated devices for use in rural areas. This is enhanced by Sthree's eco-friendly burning system and solar compatibility. Sthree expands on a QR-enabled vending system created by Komal Rajendra Salunkhe et al. (2024) by combining reward and disposal systems into a single smart device. Similarly, a Raspberry Pi-powered napkin and medication vending machine was developed by Manjunath M. Chindi et al. (2023–24). Sthree improves this through point-based incentives, eco-incineration, and RFID login. Overall, Sthree improves on previous models with clever features and user engagement tactics, innovating by fusing sustainability, automation, and health into a single system

III. SYSTEM ARCHITECTURE AND METHODOLOGY

The Sthree Women's Hygiene Hub is a smart sanitary pad vending and disposal device that combines hardware and software components. There are five functional blocks in the architecture:

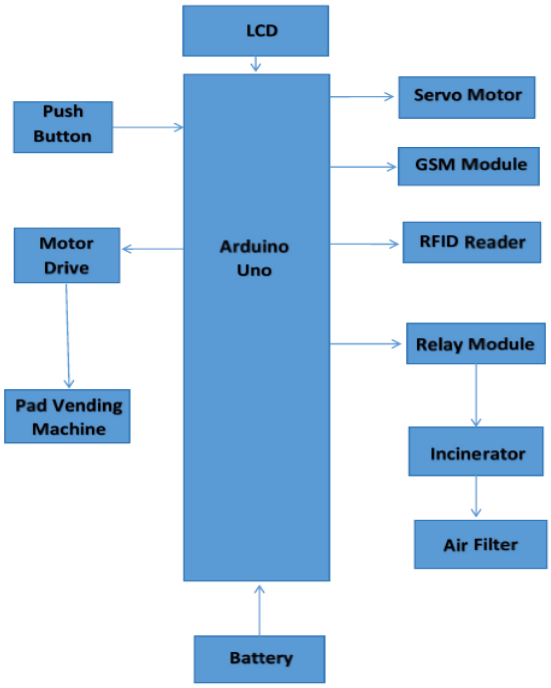

Fig 1: Block Diagram

1.Module for User Interface

- Push Button: Starts the sanitary pad vending machine.
- RFID Reader: Verifies the user's identity by scanning the RFID card to grant access.

Status messages, such as "Pad Vended" or “Place your Card” are displayed on an LCD or OLED display

2. Control Unit (Microcontroller)

- Arduino Uno/ESP32: Serves as the main controller for hardware control, credit point tracking, user input processing, and module communication.

3. The Pad Vending Unit

- Servo Motor + Driver: Presses a button to dispense one sanitary napkin.
- GSM Module: Notifies housekeeping employees via SMS when stocks are running low.

4. Unit for Incineration and Disposal

- When an RFID scan is successful, a servo motor opens the incinerator chamber. The used sanitary pad can be safely burned with a heating coil.
- Smoke is drawn out of the burning chamber by the exhaust fan.
- Smoke is filtered by a carbon air filter before being released into the atmosphere.

5. Credit and Database System

- Credit Point Tracker: After every successful disposal, points are sent to the user's account.

IV. METHODOLOGY

Step 1: The Process of Pad Vending

The pad request button is pressed by the user. After receiving the signal, the microcontroller turns on the servo motor to vend a single pad. The GSM module issues a stock alert if the pads are running low. The LCD shows confirmation as the user takes the sanitary pad.

Step 2: RFID Authentication for Pad Disposal

The user walks up to the machine and scans their RFID card after using it. After confirming the card, the microcontroller unlocks the chamber door to allow entry to the incinerator. After inserting the used pad into the chamber, the user shuts the door.

Step 3: Managing Burning and Smoke

The pad starts to burn when a relay activates the heating coil. To reduce pollution, the exhaust fan extracts the smoke and filters it with carbon.

Step 4: System of Credit Reward

The system records the disposal event following a successful burn and credit points get deposited through RFID scan.

V. IMPLEMENTATION

- Pad Vending & Disposal: Sanitary pads are dispensed by pressing a button, and the incinerator is opened for disposal by scanning RFID cards.
- Credit Points System: Every pad that is thrown away earns users points that can be redeemed for savings on school supplies.
- Stock Monitoring: Keep an eye on pad stock levels at all times and notify users when they are getting low.
- Smoke Management: To eliminate smoke produced by burning pads, use an exhaust fan and carbon filter.
- Microcontroller Integration: To control hardware parts and software modules, use a microcontroller (such as an Arduino).

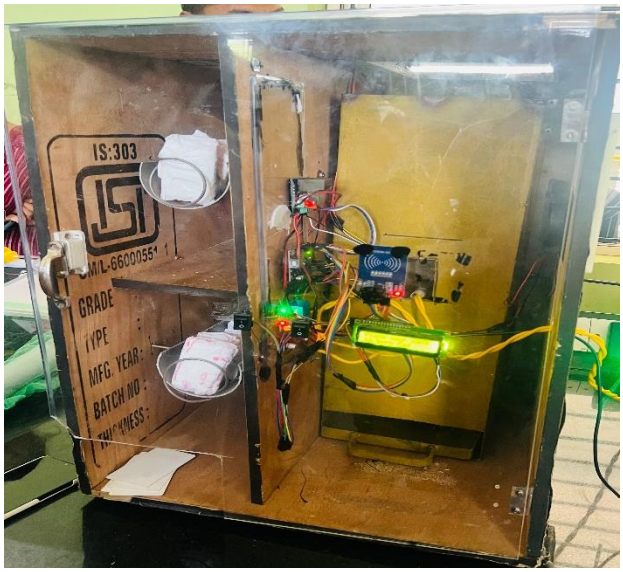

Fig 2: Model Picture

VI. CONCLUSION

By incorporating a sanitary napkin vending and disposal system, the "Sthree - Women's Hygiene Hub" project offers a creative way to address women's hygiene needs. The project encourages appropriate hygiene practices by making sanitary pads easily accessible to users via a button-activated vending machine and enabling secure disposal through RFID authentication. By offering points that can be exchanged for savings on college stationery, the credit points system encourages users to properly dispose of pads. Additionally, by sending out alerts when stocks are low, the system's stock monitoring feature makes sure that supplies are maintained effectively. A cleaner and safer environment is ensured by the efficient management of smoke generated during the incineration process through the use of an exhaust fan and carbon air filter.

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