IOT Based Sanitary Pad Vending Machine

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Abstract - **Now-a-days a menstruation is the part of the women's life it is important to take measures for the hygiene during these days. Due to poor hygiene many health problems arise. Usage of cloth during menstruation is also unhygienic. In India women are still shy of purchasing sanitary napkins from medical stores. We can overcome this problem by installing the vending machines in public places, offices, toilets, schools and colleges. The existing vending machine operates on coin which provides a napkin whenever a coin is inserted. But it has a drawback sometimes the vending machine is unable to recognize which coin due to which the napkin is easily provided when a duplicate coin is inserted. Instead of using coin we are coming up with the idea of using QR code. Whenever the QR code is scanned the napkin is dispensed and the owner gets the SMS on the registered mobile number whenever the napkin is dispensed and it also gets the count of the napkins remaining in the vending machine.**

Key Words: **IOT, Sanitary Pad Vending Machine, Accessibility, Hygiene, Menstruation, Remote Monitoring, Automated Dispensing System.**

1. INTRODUCTION

In today's society, menstrual hygiene is a crucial aspect of women's health and dignity supervision, social discomfort, or unavailability during emergencies. To address these challenges, this project proposes an IoT-based Sanitary Pad Vending Machine that automates the process of pad dispensing and enables remote monitoring through GSM communication. By integrating electronic component such as a microcontroller, GSM module, relay module, voltage regulators, and a DC motor, the machine ensures easy, hygienic, and round-the-clock access to sanitary products. This smart vending machine allows users to trigger pad dispensing By Using QR Code. Once the trigger is detected, the Arduino activates a relay that powers a DC motor. This motor runs a roller mechanism, which gently dispenses a sanitary pad.

Moreover, the GSM module sends real-time SMS notifications to the owner or maintenance personnel alerting them about pad dispensing or low stock levels. This eliminates the need for manual inspection and helps ensure the machine is always stocked and operational. The project not only provides a technological solution to a pressing social need but also supports the broader goal of promoting women's health, privacy, and empowerment through smart and sustainable infrastructure.

2. LITERATRE SURVEY

Several research studies and projects have explored the application of embedded systems and IoT technologies in health and hygiene-related automation.

Automated Sanitary Napkin Dispensers: Various projects have proposed the use of microcontrollers like Arduino and Raspberry Pi for automating sanitary pad vending. These systems generally rely on coin-based mechanisms or button-based dispensing, but lack advanced features such as remote monitoring or digital payments.

- GSM-Based Alert Systems: Previous studies have implemented GSM modules for realtime messaging systems in vending or public health devices. This improves machine maintenance and ensures timely refilling by notifying the responsible authority about low stock or usage.

- QR/UPI-Based Payment Integration: With the rise in digital payments, vending systems are being upgraded with QR code-based UPI payment systems. This reduces the dependency on cash or coins and promotes hygienic, contactless usage, especially important in health and sanitation products.
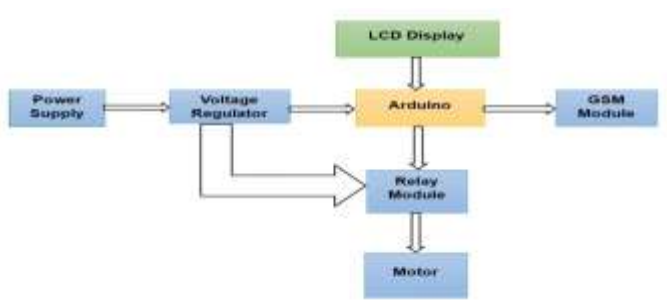
3. METHODOLOGY

Fig. 3(a): block diagram of IOT based sanitary pad vending machine

the development of this gsm-based sanitary napkin vending machine involves a combination of electronic components, communication modules, and mechanical dispensing mechanisms. the system is powered through a regulated 12v dc power supply. a gsm module is connected to the Arduino via serial communication. this module receives sms messages from users or administrators. once a sms command such as "please collect" is received, it is passed to the Arduino, which interprets it and initiates the vending process the Arduino then activates a relay module, which in turn powers the dc motor. the motor is connected to a dispensing mechanism that pushes a single sanitary napkin out of the machine. to provide real-time system feedback, a 16x2 lcd display is integrated into the circuit

additionally, the accompanying block diagram (as shown earlier) illustrates the interconnections between the power supply, voltage converter, arduino, gsm module, lcd, relay, and motor. this visualization aids in understanding the overall data flow and control logic within the system. through this methodology,

4.Hardware components

a. Arduino

Fig. 4(a): Arduino

In a QR code-based IoT sanitary pad vending machine using Arduino, the system operates by integrating online payment verification with automated dispensing. When a user approaches the machine, they are prompted to scan a QR code displayed on the machine. When it detects a successful payment, it sends a signal to the Arduino. Upon receiving this signal, the Arduino activates the motor via a motor driver to dispense one sanitary pad. It is used to confirm whether the pad has been successfully released.

b. GSM module

Fig. 4(b): GSM module

The GSM module is used in the IoT-based sanitary pad vending machine to enable wireless communication over mobile networks. It allows the vending machine to send

and receive SMS messages for data transmission. In this project, the module can be utilized to send alerts or updates to the admin or maintenance.

c. DC Motor

Fig. 4(c): DC Motor

The image shows a 12V DC geared motor, a type commonly used in vending machines to dispense products. These motors work based on electromagnetism; when electricity is supplied, a magnetic field is created, causing the armature to rotate. In vending machines, the motor is typically connected to a spiral coil that rotates to push products forward for dispensing after a payment is processed.

d. LCD Display

Fig. 4(d): LCD Display

The image shows a LCD module, a type of display commonly used to show information in electronic devices. In a vending machine, this LCD would typically interface with an Arduino to display various information, such as product selection menus, prices, and transaction details.

5. WORKING PRINCIPLE

The IoT-based sanitary pad vending machine operates using an Arduino, which serves as the central controller for all hardware components. When the system is powered on, it initializes all modules, including the LCD display, GSM module, relay module, and DC motor. The LCD displays a welcome message and prompts the user to scan a QR code to initiate the vending process. In the case of QR code payment, the user scans the QR code using mobile payment app and completes the transaction. Once the payment is verified through a connected server the Arduino proceeds to dispense a sanitary pad. Upon receiving valid input or payment, the Arduino activates the relay module, which supplies power to the DC motor for a predefined duration. This motor rotates the dispensing mechanism, releasing a single sanitary pad to the user. Throughout the process, the LCD display provides status updates, such as "THANK YOU" and "PLEASE COLLECT" After dispensing, the system resets and returns to its initial state, ready for the next user. To enable remote monitoring, the system includes a GSM module that sends SMS alerts to the administrator after each dispensing event. These messages can include notifications such as "AVAILABLE" ensuring timely maintenance and refilling. The entire system is powered by a 12V DC supply, which is regulated using a voltage regulator to provide stable 5V power to the Arduino and other low-voltage components

6. RESULTS

The proposed IoT-based sanitary pad vending machine was successfully designed and implemented using the Arduino. The system efficiently controls the pad dispensing mechanism through a relay-operated DC motor, while providing user interaction via an LCD display. Upon successful QR code payment or button input, the system dispenses a sanitary pad and sends a real-time SMS alert to the administrator using the GSM module.

Fig. 6(a): LCD displaying the availability

Fig. 6(b): LCD displaying of pad Authentified message on Payment

Fig. 6(c): LCD displaying to Collect the pad

7. ADVANTAGES

•Supports UPI-based QR code payments, offering a cashless, contactless, and user-friendly experience.

•The GSM module enables remote alerts to administrators for low stock, ensuring timely maintenance.

•LCD display provides clear instructions and feedback, making the system easy to use even for first-time users.

• The system can be upgraded with additional features like stock available and mobile app control.

8. APPLICATIONS

• To provide easy and hygienic access to sanitary pads for female students, reducing embarrassment and promoting menstrual hygiene education.

• Useful in public transport facilities to offer emergency access to sanitary pads for women travelers.

•Helps create a supportive and hygienic work environment for female employees.

• Ensures availability of sanitary pads in places with high foot traffic, improving convenience for women.

9. CONCLUSION

This project demonstrates an effective and affordable solution to address menstrual hygiene accessibility using embedded systems and IoT technologies. The integration of Arduino, QR-based digital payment, and GSM communication enables the system to function autonomously with minimal human intervention. It supports hygienic, contactless, and real-time sanitary pad dispensing, making it highly suitable for schools, colleges, hospitals, and public places.

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