MEDICINE AND FEMMECARE SANITARY NAPKINS VENDING MACHINE

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Introduction: The methodology for developing a vending machine system suitable for rural areas involves initiating the process by designing a concept based on the community's needs and available technologies. Subsequently, a prototype vending machine is constructed, integrating components like Raspberry Pi, Pi camera, LCD display, DC motor, and spring. This prototype undergoes thorough testing to ensure functionality and usability in rural settings.

The next phase involves the development of software for the Raspberry Pi, managing the user interface, QR code scanning, validation, and product dispensing. Concurrently, hardware components are integrated into the vending machine enclosure, with a focus on ensuring proper wiring and connections.

A crucial aspect is the design of an easy-to-use interface for the LCD display, facilitating straightforward product selection and payment for users with varying technical knowledge. Simultaneously, the physical structure of the vending machine, including a disposal container with a heating element for sanitary pads, involves incorporating a nichrome heating coil for burning. A program is developed on the Raspberry Pi to scan unique valid QR codes for disposing the sanitary pad. The Pi camera scans and interprets valid QR codes, triggering the motor-controlled dispensing mechanism. The disposal aspect involves integrating a nichrome heating coil within the machine, enabling the sanitary pads' safe burning, addressing hygiene concerns.

In essence, this methodology systematically progresses through conceptual design and prototype development, software and hardware integration, user interface design, mechanical

design and fabrication, and finally, awareness program and educate users about usage of machine. The goal is to create a user-friendly vending machine system that meets the specific needs of rural areas while ensuring ease of operation and maintenance for the community.

Objectives:

- Concentrate on tackling the problem of menstrual cleanliness by granting free sanitary napkins to enrolled women through an individualized QR code system, aiming to authorize women and advocate better health habits.
- Utilizing Raspberry Pi technology and QR codes to streamline the process of obtaining sanitary napkins and medicines, ensuring a user-friendly and proficient experience for individuals in rural areas.
- Implementing a specifically designated disposal area for incinerating utilized menstrual pads, with limited entry exclusively for authorized staff to activate it, ensuring safety during the incineration process of the discarded pads by females in rural regions promoting eco-friendly practices and environmental preservation.
- Incorporate a digital touch display for easy user interaction, allowing individuals to select and dispense products efficiently, enhancing the overall user experience.
- Enable women without QR codes to acquire sanitary napkins by offering alternative payment options such as a 5-rupee coin or digital payment methods, ensuring inclusivity and convenience.
- Medicines are available for a minimal charge of 2-rupee, either by coin or digital payment methods ensuring cost-effective access to healthcare products.

Methodology:

This methodology outlines the sequential steps involved in establishing, testing, and evaluating the vending machine system designed to provide sanitary napkins and medicines in rural areas. Firstly, the system setup involves gathering and assembling necessary components such as Raspberry Pi, digital display, DC motor, motor drive, power supply module, IR sensor, and Pi camera. Configuration of the Raspberry Pi ensures compatibility and connectivity with other hardware components. Subsequently, QR code generation involves developing a program on the Raspberry Pi to generate unique QR codes for each sanitary napkin and medicine item intended for vending.

Camera integration and scanning entail establishing Pi camera functionality to accurately interpret generated QR codes, along with developing code to trigger the camera for QR

code scanning upon user interaction. The motor-controlled dispensing mechanism is then set up using a DC motor and motor drive system to control product dispensing based on QR code scanning. Programming ensures the motor activates for product retrieval upon successful QR code validation.

Following this, user interface development focuses on designing and creating an intuitive interface displayed on the digital screen for QR code scanning, product selection, and transaction completion. User-friendly prompts and instructions are integrated to guide users through the vending process.

Testing and calibration are crucial stages where the entire system undergoes accurate testing to ensure proper functionality and synchronization among hardware components. Calibration of the IR sensor, motor drive, and camera system optimizes accuracy and reliability.

Lastly, a feasibility assessment evaluates the vending machine's performance in a simulated rural environment, considering power requirements, operational efficiency, and durability. The feasibility assessment also examines the ease of use and maintenance of the setup in rural settings, ensuring its practicality and effectiveness in addressing healthcare accessibility challenges.

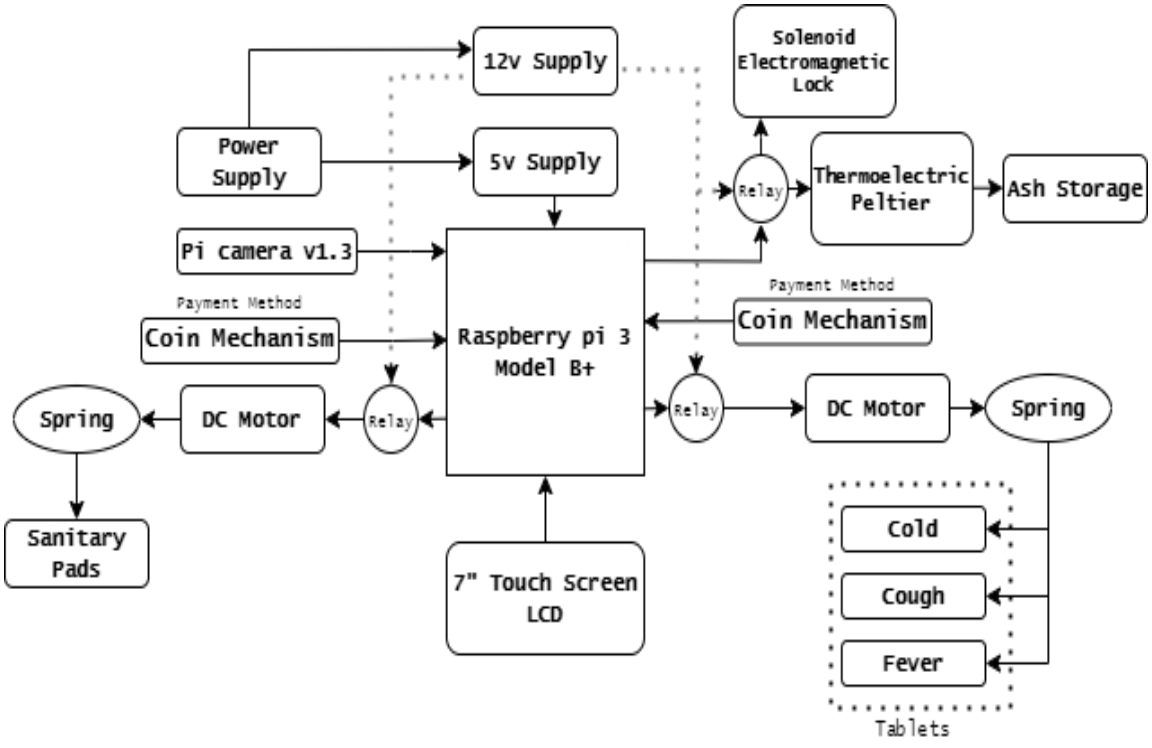

Fig. 1. Block Diagra

Results and conclusion:

The vending machine project was meticulously planned to tackle the challenge of healthcare accessibility in rural areas. We began by assembling and configuring essential components such as Raspberry Pi, digital display, DC motor, motor drive, power supply module, IR sensor, and Pi camera. These components were selected with care to ensure seamless compatibility and optimal performance within the vending machine system. Following this, we developed a specialized program on the Raspberry Pi to generate unique QR codes for each sanitary napkin and medicine item, enabling personalized access for users. Efforts were also directed towards enabling the Pi camera to accurately interpret these QR codes during the scanning process, ensuring a smooth and efficient user experience.

Additionally, we implemented a motor-controlled dispensing mechanism to provide precise control over product dispensing based on QR code validation. The user interface was designed to be intuitive and user-friendly, with a digital screen allowing for easy navigation of product selection and payment processes. Thorough testing and calibration were conducted to verify proper functionality and synchronization among hardware components, ensuring reliability in rural environments. In conclusion, the vending machine project represents a comprehensive solution to address healthcare accessibility challenges in rural areas, providing a convenient, hygienic, and accessible means for individuals to access essential healthcare products.

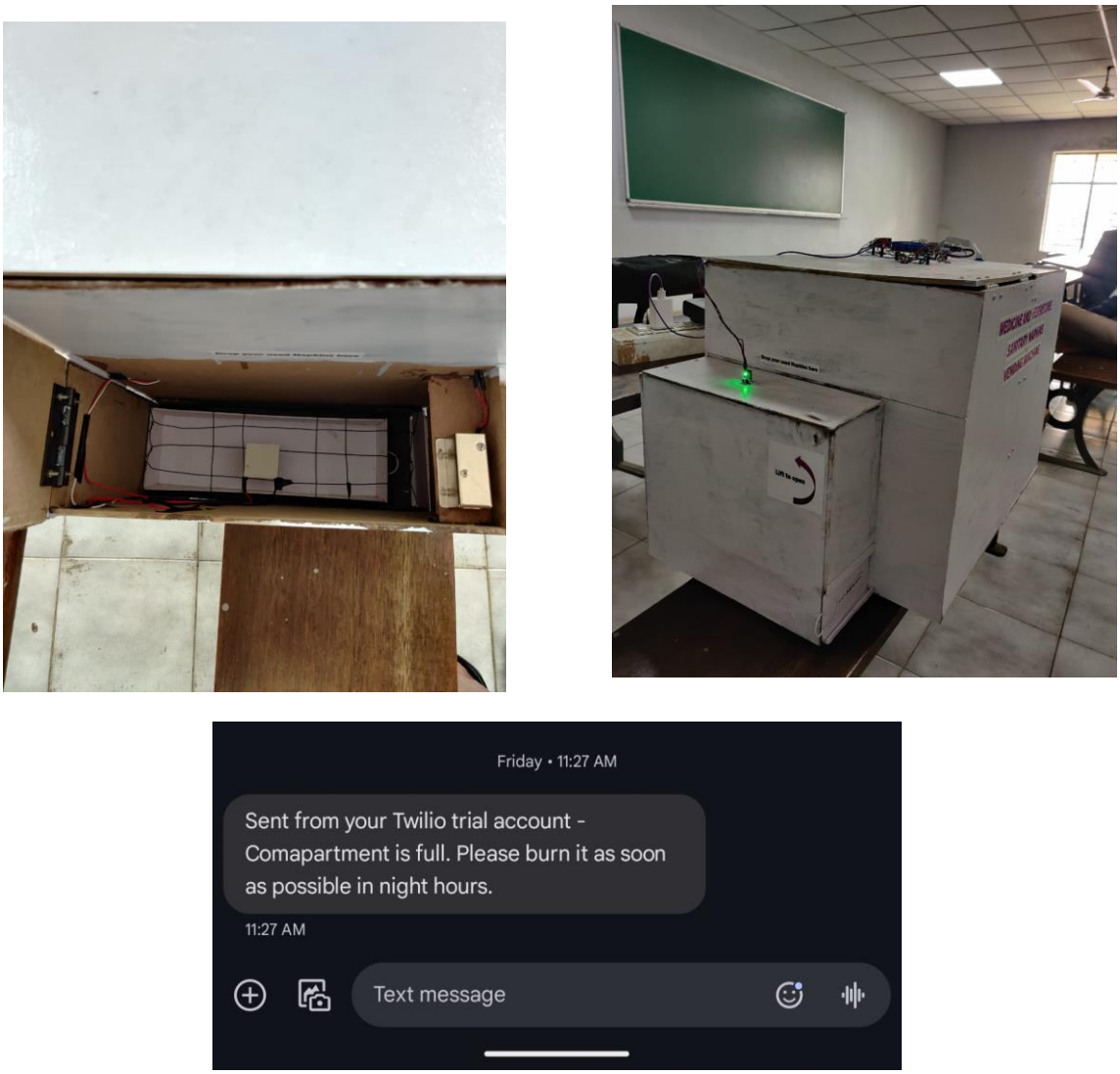

Fig. 2. Project Model

Innovation in the Project:

The innovation in this project lies in its comprehensive approach to addressing menstrual hygiene and healthcare accessibility in rural areas. By integrating Raspberry Pi technology with a camera, touch screen display, and digital payment options, the vending machine offers a user-friendly and efficient solution. The unique aspect is the QR code system for free sanitary napkins, ensuring accessibility and affordability. Additionally, the automated disposal system with controlled access for burning used napkins enhances hygiene and safety. This combination of advanced technology and practical features makes the vending machine a novel and impactful solution for improving health and hygiene in underserved communities.

Future Scope:

1. Integration with Government Programs: Collaborate with government health initiatives to subsidize costs and promote widespread use.

2. Enhanced Product Variety: Include a broader range of medicines and hygiene products to cater to diverse health needs.

3. Mobile App Integration: Develop a mobile app for easier access to vending machine locations, product availability, and digital payments.

4. Data Collection for Health Insights: Use data analytics to monitor usage patterns, helping to inform public health strategies and resource allocation.

5. Solar Power Utilization: Implement solar-powered vending machines to ensure operation in areas with limited electricity.