SMART SANITARY PAD AND MEDICINE VENDING MACHINE WITH AUTOMATED DISPENSING, DISPOSAL, AND NOTIFICATION SYSTEM

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Abstract : This project presents the design and execution of an intelligent vending machine that integrates sanitary pad dispensing, medicine dispensing, and advanced features for user convenience. The structure is constructed employing Arduino, an LCD display, keypad, RFID technology, a DC motor for dispensation, and NodeMCU for conveying message notifications.. The machine is equipped with a user-friendly interface consisting of an LCD display and a keypad for easy interaction. Users can navigate through the menu to select and purchase sanitary pads or medicines based on their specific requirements. The RFID technology ensures secure user authentication, allowing only authorized individuals to admission the vending machine. The dispensing mechanic employs a precise DC motor to ensure accurate and controlled distribution of sanitary pads and medicine. The system includes a disposal unit to promote environmental sustainability by facilitating the proper disposal of used sanitary pads. Furthermore, the inclusion of NodeMCU enables the implementation of a notification system. Users receive real-time messages regarding their transaction details, product availability, or other relevant information through a wireless communication network. This feature enhances user experience and provides transparency in vending machine operations. The suggested system not only tends to the current requirements of users but take part in promoting cleanliness, facilitating convenience, and upholding environmental responsibility. The integration of Arduino, RFID, DC motor, LCD display, keypad, and NodeMCU makes this vending machine a comprehensive and efficient solution for public spaces, schools, offices, or any location where easy access to sanitary products and medicines is essential. This project combines technology and user-centric design too creates a versatile and intelligent vending machine, catering to the diverse needs of its users.

1. INTRODUCTION

In contemporary society technology and healthcare, it has led to innovative solutions, you know, like addressing various aspects of public health and hygiene. So one solution is the Smart Sanitary Pad and Medicine Vending Machine combines all these things like Arduino, RFID technology, DC motors, LCD display, keypad, and NodeMCU. It's all about, you know, efficient and user-centric dispensing, disposal, and communication. Access to sanitary pads and medicines is like, totally important for healthcare, you know, and we ensure they're available in public spaces, like, for the well-being of people. Traditional vending machines, they don't really cater to the specific needs of users. They lack features for secure authentication, proper disposal, and real-time communication. But this new vending machine, it bridge up those gaps cause it uses, you know, cutting-edge technologies. Arduino is the brain of this whole system. It, you know, orchestrates everything and integrates all the components together. It resembles an open-source platform that offers versatility. Additionally, there is an LCD display and keypad, facilitating users to easily make selections according to their preferences .And then there's RFID technology that makes it, like, secure so only ratified people can use it. The vending machine has this, like, DC motor that makes sure the sanitary pads and medicines are, like, delivered accurately and controlled. And there's also this disposal unit that, you know, addresses the proper disposal of used sanitary pads and , NodeMCU allows for wireless communication. So people get, you know, real-time messages about their transactions, availability of products, and, you know, other useful. It makes the whole experience better and makes the vending machine, like, transparent and all. The Smart Sanitary Pad and Medicine Vending Machine is a pretty cool project. It's, you know, all about using technology to check whether they have approach to the things that needed for their health and, you know, it's like bridging all the gaps and making it more effective and user-friendly. The correlation between social status and health inequalities holds significant importance in serving the country, as highlighted by the World Health Organization (WHO). The disparities in people's health are often attributed to their socioeconomic conditions, making it imperative to address and find solutions for this issue. Recent reports shed light on a staggering 88% of menstruating women in India experiencing reproductive problems due to inadequate access to sanitary products. Additionally, about 23% of women opt out of schools and colleges post-menstruation. A sanitary pad, an absorbent

item worn by women during menstruation, post-childbirth, or recovery from gynecologic surgery, plays an important role in preventing odors and potential infections. Regular changes, recommended every 3–4 hours, are essential to avoid bacterial growth in the blood.

Menstrual pads come in various styles, materials, and brands, creating diverse options. This project seeks to bridge multiple disciplines, combining mechanical, electronic, electrical, and programming skills. Its focus on rural areas is a positive step, capturing societal attention, fostering innovation and creativity, and enhancing valuable problem-solving skills applicable in life. In addressing social and health inequalities, it is vital to underscore the effect of socioeconomic factors on health outcomes. The obstacles faced by menstruating women in India, particularly the not accessible to sanitary products and subsequent reproductive health issues, require comprehensive solutions. Highlighting the interdisciplinary project's significance, its potential to bring positive change in women's health and access to sanitary products is crucial. Introducing such initiatives in villages , where healthcare product accessibility is limited, contributes to community development, empowerment, and societal attention. The emphasis on menstrual hygiene's important, not only for health but also for preventing infections, underscores the need for awareness. Integrating educational campaigns with innovative projects is key to altering cultural attitudes and promoting healthy practices. Additionally, considering the environmental impact, sustainable options like biodegradable materials or reusable products should be explored. Balancing technical innovation with cultural sensitivity is essential to effect positive change and enhance health outcomes for diverse populations.

2. LITERATURE SURVEY

The table encompasses crucial details such as the name of the study, author(s), publication year, research objectives, and key advantages and disadvantages identified in each work.

Praveen Kumar et.al. [1] In past few years, there has been a noticeable increase in the proliferation of vending machines designed to offer a variety of products through unique numeric selections.

These machines encompass various categories, including food dispensers, chocolate vending machines, snack vendors, and even dispensers for liquid products like glucose water. However, despite these advancements, an apparent gap remains in the obtainable of first aid facilities across locations such as schools and transportation hubs. In the 21st century, the non-attendance of ubiquitous first aid kits and immediate access to essential medications is evident, particularly in areas undergoing infrastructural upgrades. This gap in accessibility becomes crucial in situations where obtaining prompt medical awareness is imperative, and reaching a doctor may not be the immediate course of action. Consequently, the idea of introducing vending machines specifically designed to dispense first aid items and

necessary medicines emerges as an innovative solution. These vending machines could serve a vital role in providing immediate assistance during emergencies, especially in scenarios where swift access to medical supplies is paramount. Placing such machines strategically in schools, public spaces, transportation hubs, and remote areas could bridge the gap between an incident occurring and the arrival of professional medical assistance. The sake of this concept include enhanced accessibility to medical supplies, 24/7 availability, time-saving in critical situations, user-friendly interfaces, and the potential for customization on basis of the particular needs of different locations and demographics. However, several considerations must be taken into account for the prosperous execution of these vending machines. This includes adherence to local regulations and licensing for dispensing medications, regular maintenance and restocking to ensure operational efficiency, implementation of security measures to prevent theft and vandalism, and the understanding that these machines are supplementary to, not a replacement for, professional medical advice. Introducing vending machines dispensing first aid kits and medications could be a valuable addition to public health infrastructure. Collaborating with healthcare professionals, regulatory bodies, and local communities will be essential in navigating the complexities of this concept's implementation successfully.

Anil Kumar D B et.al . [2] It is foundational to give suppository to the older in stretch. Whenever medication candy machine, that's explicitly planned for clients who take prescriptions without close proficient oversight, is here to help! It soothes the client of those blunder inclined errands of directing incorrectly medicine at the wrong time. Let's delve into the significant components and operation of this innovative drug distributor. Components of the Imperfect Medication Vending Machine The significant components of this not-so-perfect yet innovative drug distributor are a miniature regulator, gracefully interfaced with an alpha numeric keypad and engine regulator that sometimes goes vroom when it's not supposed to an alert framework that's a bit too loud and various pill compartment and container with a couple of hidden compartments.

Huiling Xia et.al. [3] This thesis introduces an innovative approach for intelligently recognizing medicine names within medicine vending machines. The methodology is based on observation that the medicine name typically stands out as the largest character on the medicine box. Consequently, the process of recognizing medicine names is framed as identifying the largest character within the images discussed in this thesis. To achieve this, the initial step involves the application of Support Vector Machine (SVM) and Connected Component techniques to mute the text region. Following this, the identification of the largest connected agglomeration is pivotal for precisely pinpointing the medicine name. Subsequently, a "fragment link" method

is implemented for text segmentation. This method dissects the text into two distinct components: fragments and links. Furthermore, the strategic insertion of dashes is introduced, facilitating the reconstruction of the whole word according to predefined rules. The concluding step employs Optical Character Recognition (OCR) software for accurate character recognition. The results of experiments affirm that this method exhibits a remarkable precision rate in identifying medicines.

Pruthvesh Desai et.al. [4 This paper introduces the prototype of the All Time Medicine and Health (ATMAH) device, designed to serve the medical needs of individuals requiring medications or health assistance. ATMAH encompasses an automated medicine vending machine programmed to dispense drugs on basis of a doctor's prescription. Overseeing the vending mechanism is the Raspberry Pi, a single-board computer. The secondary component encompasses an online portal, providing users with the capability to review their prescriptions and facilitating doctors in the generation of electronic prescriptions .The device operates by dispensing the prescribed medication once user details are checked against database. The online portal is bifurcated into a webpage and an Android application, both interconnected with the same database. They can easily use their details and prescriptions through either the Android application or the webpage. Logging in with the appropriate credentials grants patients access to their information and prescriptions, contributing to an enhanced overall user experience.

Divya Ganesh et.al. [5] The COVID-19 pandemic, an unprecedented global crisis, has presented an immense challenge to the medical industry in the 21st century, profoundly altering the fabric of daily life. The escalating number of individuals affected by the virus has instilled a deep-seated fear, discouraging people from seeking essential healthcare services. This paper introduces the Automatic Health Machine (AHM), employing IoT and Artificial Intelligence technologies to facilitate access to medical facilities, especially in rural and urban areas, during pandemics and medical emergencies The Automated Health Machine (AHM) offers a comprehensive virtual health assessment, enabling users to link healthcare professionals online, schedule swab tests, and request emergency ambulance services on the basis of their medical condition. With features such as swab test administration, emergency medicine dispensation, and electronic prescription issuance, AHM prioritizes individual well-being across all age groups. Access to AHM services is facilitated through a "Smart Health Card," aligning with the United Nations Sustainable Development Goal 3 (SDG3), which focuses on ensuring healthy lives and well-being. Accordance with various industries and hospitals, our initiative sought to comprehend healthcare and patient needs, particularly in the context of pandemics. Conducting virtual workshops with COVID-recovered patients, frontline nurses, and doctors provided valuable insights, with healthcare professionals expressing optimism about the potential adoption of the system in areas lacking immediate medical facilities .The joint collaboration has guide to the creation of a patented technology acknowledged in both India and the United States .The AHM's virtual health checkup feature emphasizes convenience and accessibility, allowing users to engage with medical professionals remotely. Appointment scheduling options for swab tests and emergency ambulance services underscore the attention of timely healthcare interventions. The machine's diverse services, including swab test administration and electronic prescription issuance, contribute to its holistic approach to healthcare delivery.

The Smart Health Card plays a pivotal role in granting users access to AHM services, ensuring secure storage of patient information and facilitating streamlined healthcare delivery. The AHM's alignment with SDG3 highlights its commitment to promoting healthy lives and well-being in accordance with global sustainability goals. The collaboration with industries and hospitals underscores the attention of understanding healthcare and patient requirements during pandemics and emergencies. Insights gained from virtual workshops have been instrumental in shaping the AHM system, with healthcare professionals expressing confidence in its potential to address medical needs in underserved areas. The patented technology resulting from these endeavors represents a significant advancement in healthcare solutions, with recognition in both the Indian and American markets. The AHM's positive impact on survival rates during unprecedented events like pandemics and epidemics further underscores its relevance in emergency healthcare situations

Gayathri Seshadri el.al. [6] .This document investigates the functionalities of the Automated Health Machine (AHM) leveraging Internet of Things (IoT) technology. The AHM distinguishes itself as a health device designed with a user-friendly interface, incorporating interactive graphical elements to cater to various medical needs. Positioned as a virtual health check-up and self-screening system, it assumes the role of the primary interface for patient screening, allowing for the tracking of essential health metrics such as heart rate, blood pressure, ECG, oxygen saturation, and visual acuity. During emergency circumstances, the AHM enables remote discussion with healthcare professionals via video calls.. Depending on the hardness of the patient's condition, the system has the capability to coordinate the dispatch of a van or bike ambulance. In cases involving unconscious patients, the initiation of emergency ambulance booking can be easily initiated with a simple call. In non-emergency scenarios, users have the flexibility to schedule medical appointments, obtain prescribed medications based on health assessments and doctor's e-prescriptions, and choose from a selection of available medicines. To streamline healthcare management and enhance user convenience, each user is issued a "smart health card" consolidating personal details, health information, prescriptions, and medication history. The incorporation of IoT technology into the AHM enhances its

functionality, making it a comprehensive and accessible solution for a diverse range of medical requirements. Each user receives a "smart health card" that consolidates personal details, health information, prescriptions, and medication history. The AHM, also referred to as "Self Healthcare Service (SHS)" or "Self Healthcare Units (SHU)," aligns with the United Nations' Sustainable Development Goals (SDG-3), which advocate for such initiatives. Pilot evaluations conducted with patients, nurses, and doctors indicate a positive reception. Practitioners suggest that the system could be effectively deployed in areas lacking immediate medical facilities. Implementation in such locations could significantly contribute to managing medical emergencies, epidemics, pandemics like COVID, and potentially enhance survival rates.

Erika Alzate el.al. [7] This article delves into the exploration and assessment of the environmental consequences associated with the utilization and disposal of menstrual cups and sanitary pads. The environmental evaluation in this study adopts the Conesa methodology. The determination of environmental significance involves considering evidence and the likelihood of occurrences. Laboratory analyses were conducted to assess physicochemical parameters in human menstrual blood samples. Simultaneously, the quantity of solid waste produced by each product was ascertained based on a representative sample of the population. These examinations provided insights into the quality of the liquid waste, specifically menstrual blood, and identified potential impacts on biotic, abiotic, and socio-economic aspects. The discovery were then compared between menstrual cups and sanitary pads. Notable negative impacts include the "Alteration of the local economy," identified in the disposal of sanitary pads' solid waste, and "customs," discovered in the usage of menstrual cups. This thorough analysis contributes valuable insights into the environmental ramifications of these feminine hygiene products, fostering a deeper understanding of their ecological footprint.

3. METHODOLOGY

This work on basis of the sanitary pad machine where it is placed all over the public places and streets where the females especially traveling from one place to another and who can't afford it for higher cost, they can buy for free using "access card" will be provided with the access card To the Particular person can take 5 pads for month napkins per person for a month. This process will be used with the help of using sanitary pad vending machine where is our sanitary pad machine placed and quantity of pads filled in the machine.

1. Requirement Analysis: Conduct a thorough analysis of user requirements and expectations for the vending machine, considering factors such as product variety, customization options, user authentication, and real-time communication.

2. System Design: Develop a comprehensive system architecture that outlines the integration of Arduino, LCD display, keypad, RFID, DC motor, and NodeMCU. Define the communication protocols, data flow, and interfaces between components.

3. Hardware Selection and Integration: Choose appropriate hardware components, ensuring compatibility and functionality. Integrate the Arduino board, LCD display, keypad, RFID reader, DC motor, and NodeMCU into a cohesive system. Establish reliable connections and test hardware interactions.

4. RFID Authentication System: Develop an RFID-based authentication system to ensure secure access. Assign unique RFID tags to authorized users and implement a validation mechanism. Test the system's ability to grant access only to authenticated individuals.

5. Dispensing Mechanism Implementation: Integrate the DC motor into the dispensing mechanism, ensuring precise and controlled product distribution. Implement algorithms for dispensing based on user selections and verify the accuracy of dispensing.

6. Disposal Unit Integration: Design and integrate a disposal unit for used sanitary pads, incorporating a hygienic and environmentally friendly solution. Ensure proper alignment with waste disposal standards and conduct tests to validate the functionality.

7. Node MCU for Message Notification: Implement wireless communication using Node MCU to enable real-time message notifications. Develop protocols for communication with users, such as transaction confirmations, product availability alerts, and system updates. Verify the reliability of message delivery.
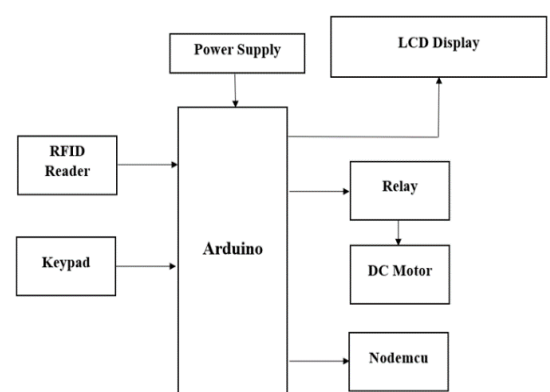
4. CONCLUSION

Our core objective is to revolutionize the acquisition of sanitary pads by introducing a system that allows for easy and discreet access without the requirement for wrapping in papers or concealing in black covers. The proposed implementation of the EASY PADS vending machine aims to enhance the availability of pads, especially during emergencies and for individuals on the move, with a specific emphasis on rural areas. This initiative is designed to alleviate potential embarrassment that women may face when purchasing sanitary pads, offering a cost-effective and more efficient solution compared to previous methods.

The EASY PADS vending machine facilitates automatic dispensing of sanitary napkins, eliminating the need for manual intervention. This innovation not only ensures easy access to sanitary pads but also helps prevent the occurrence of hazardous diseases such as toxic shock syndrome (TSS) and uterine cancer. The real-time solution addresses accessibility challenges and opens avenues for future enhancements. In subsequent iterations, additional features can be integrated into the project. The inclusion of a disposal unit, fabricated and harmonized with the vending machine, would allow for both dispensing and disposing within a single unit, contributing to environmental cleanliness. Furthermore, the project holds considerable potential for collaboration with government initiatives aimed at advancing women's welfare.

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