

SMART SANITARY NAPKINS VENDING MACHINE

Mr. Hemanth Kumar¹, Nisha B N², Pooja V³, Thrupthi G⁴, Varsha D M⁵

¹Assistant Professor, Dept. of ISE, East West Institute of Technology, Bengaluru

²Student, Dept. of ISE, East West Institute of Technology, Bengaluru

³Student, Dept. of ISE, East West Institute of Technology, Bengaluru

⁴Student, Dept. of ISE, East West Institute of Technology, Bengaluru

⁵Student, Dept. of ISE, East West Institute of Technology, Bengaluru

Abstract – Our project, the Smart Sanitary Napkins vending machine, is an innovative solution that combines the functionalities of dispensing sanitary pads and medicines while incorporating advanced features for user convenience. Utilizing Arduino, LCD display, keypad, RFID technology, DC motor, and Node MCU, we've developed a robust system that enhances accessibility and usability. At its core, our vending machine boasts a user-friendly interface, featuring an LCD display and keypad for seamless interaction. Users can easily navigate through the menu to select and purchase either sanitary pads or medicines according to their specific needs. The integration of RFID technology ensures secure user authentication, granting access only to authorized individuals. The dispensing mechanism is driven by a precise DC motor, guaranteeing accurate and controlled distribution of sanitary pads and medicines. Additionally, we've incorporated a disposal unit to promote environmental sustainability by facilitating proper disposal of used sanitary pads.

Keywords--- Arduino, LCD display, keypad, RFID technology, DC motor,

1. INTRODUCTION

In modern society, the fusion of technology and healthcare has led to groundbreaking solutions addressing public health and hygiene concerns. One such innovation is the Smart Sanitary Pad and Medicine Vending Machine, a project that harnesses Arduino, RFID technology, DC motors, LCD display, keypad, and Node MCU to streamline dispensing, disposal, and communication. The project aims to ensure the availability of essential healthcare products in public spaces, catering to the diverse needs of individuals. Traditional vending machines often fall short in meeting specific user requirements, lacking features for secure authentication, proper disposal, and real-time communication. Our solution seeks to bridge these gaps by leveraging state-of-the-art technologies. Arduino acts as the central control unit, orchestrating the seamless integration of components. An intuitive interface comprising an LCD display and keypad simplifies user interaction, enabling individuals to navigate through the vending machine's offerings effortlessly. RFID technology enhances security, permitting access only to authorized users. The precision of the DC motor ensures accurate and controlled dispensing of sanitary pads and medicines, while a built-in disposal unit promotes environmental sustainability by facilitating proper waste management. A standout feature of the vending machine is the incorporation of Node MCU, enabling wireless communication for real-time notifications. Users receive updates on transactions, product availability, and other relevant information, enhancing transparency and user engagement.

Furthermore, addressing social disparities in healthcare access, particularly in rural areas, is a primary objective. The project aspires to raise awareness, foster innovation, and cultivate problem-solving skills across various disciplines. By promoting connections between mechanical, electronic, electrical, and programming domains, it encourages holistic learning experiences.

2. LITERATURE SURVEY

1. "Solar Powered Medic Vending Machine"

Published in: 2020

Authors

Praveen Kumar

Shailaja Singh

Manu Choudhary

K. Singh

Electronics and Instrumentation Engineering, GCET, Greater Noida, India

Over the past few years, vending machines have become increasingly diverse, offering a wide range of products from snacks and beverages to specialized items like glucose water. However, despite these advancements, there's been a notable absence of vending machines providing essential medical supplies like first-aid kits in crucial locations such as schools and transportation hubs. The Solar Powered Medic Vending Machine aims to fill this gap by offering immediate access to first-aid items and necessary medications, particularly in areas where pharmacies may be scarce or under development. This innovative concept seeks to revolutionize how people access healthcare by providing essential medical supplies where traditional pharmacy services are unavailable.

2. "Embedded system Based Anytime Medicine Vending Machine"

Author: Anil Kumar D B, Doddabasappa N, Mohammed Muhiudin, Ananda M H, Manish R K, Vamshi Krishana

Year of publication: 2021.

Whenever Medication Vending Machine is designed to cater to clients who require medication but may not have constant professional oversight. It aims to simplify the process of taking medication and reduce the risk of errors, especially for older individuals who may need suppositories or other specific medications during their recovery or treatment. The key components of this vending machine include a miniature controller connected to an alphanumeric keypad, a LED display, a motor controller, an alert system, and compartments for storing various pills.

3. "Machine Learning Based Medicine Distribution System"

Author: Huiling Xia, Huiling Xia, Chunzhi Wang, Huiling Xia, Lingyu Yan, Huiling Xia, Xinhua Dong, Yichao Wang

Year of publication: 2019

Intelligent method for identifying medicine names within vending machines. It capitalizes on the observation that the medicine name typically appears as the largest text on the medicine box. Thus, the recognition of medicine names is approached as recognizing the largest characters in the image. Initially, Support Vector Machine (SVM) and Connected Component techniques are employed to detect the text region in the image and identify the largest connected region, which likely corresponds to the medicine name. Subsequently, a "fragment link" method is utilized for text segmentation, dividing the text into fragments and links and then reassembling them into complete words based on predefined rules.

4. "All Time Medicine and Health Device"

Author: Pruthvish Desai, Biswamoy Pattnaik, Sreya Dey T.S. Aditya, Karthik Rajaraman, M. Aarth

Year of Publication: 2019.

This paper introduces the prototype development of the All Time Medicine and Health (ATMAH) device, aiming to support individuals in need of medication or medical assistance. ATMAH comprises an automatic medicine vending machine capable of dispensing medications according to a doctor's prescription. This vending machine is powered by a Raspberry Pi, serving as a control system. In addition to the vending machine, the device includes an online portal that offers various functionalities. Users have the ability to access this portal to review their prescriptions, while doctors can generate electronic prescriptions. Once the user's credentials are authenticated against the database, the device dispenses the prescribed medications. The online portal encompasses both a webpage and an Android application, both interconnected to a shared database. Patients can conveniently access their details and prescriptions through either the Android application or the webpage by logging in with their respective credentials.

5. "Automatic Health Machine for COVID-19 and Other Emergencies"

Author: Divya Ganesh, Gayathri Seshadri, Sumathi Sokkanarayanan, Panjavarnam Bose

Year of Publication: 2021

This paper presents the Automatic Health Machine (AHM), a solution designed to tackle the challenges presented by the COVID-19 pandemic and medical emergencies, particularly in both rural and urban settings. The AHM utilizes IoT and Artificial Intelligence technologies to grant users remote access to medical services. It offers a comprehensive virtual health assessment, facilitates online consultations with healthcare professionals, and allows users to schedule appointments for swab tests or ambulance services based on their specific medical needs. Furthermore, the AHM can dispense swab tests or emergency medications and provides electronic prescriptions for future reference. Access to AHM services is made possible through a "Smart Health Card."

6. "AutoImpilo: Smart Automated Health Machine using IoT to Improve Telemedicine and Telehealth"

Author: Divya Ganesh, Gayathri Seshadri, Sumathi Sokkanarayanan, Panjavarnam Bose

Year of Publication: 2020

This paper discusses the Smart Automated Health Machine (AHM), which utilizes Internet of Things (IoT) technology.

The AHM serves as a virtual health check-up and self-screening system, functioning as the primary point of contact for patient assessment. It monitors vital signs such as heart rate, blood pressure, ECG, oxygen saturation, and visual acuity. During emergencies, patients can access online consultations with doctors via video calls. Depending on the severity of the situation, doctors can arrange ambulance services. If a patient is unconscious, bystanders or caregivers can directly request ambulance assistance. The system also facilitates medication dispensing based on health conditions or electronic prescriptions.

7. "The use of sanitary pads and menstrual cups and their impact on environment"

Author: Erika Alzate, Yuly Sánchez

Year of publication: 2020

This article examines the environmental impacts of using and disposing of sanitary pads and menstrual cups. The study utilizes the Conesa methodology for environmental assessment. Laboratory analyses were conducted to evaluate the physicochemical parameters of menstrual blood samples and determine the amount of solid waste generated by each product identifies possible impacts on the biotic, abiotic, and socio-economic aspects associated with the disposal of sanitary pads and menstrual cups. Another impact identified relates to customs associated with the use of menstrual cups. Overall, the study provides insights into the environmental implications of these feminine hygiene products.

3. METHODOLOGY

This section outlines the methodology adopted for the development and implementation of the Smart Sanitary Napkin Vending Machine, and including the hardware and software components utilized.

This project aims to introduce a sanitary pad vending machine system to offer free access to sanitary pads in public settings, particularly benefiting women who may face financial constraints. Users are provided with an "access card" allowing them to retrieve a limited number of pads each month from designated vending machines placed strategically in public areas like markets, colleges, bus stops, and rural regions. By facilitating easy access to sanitary pads, especially in environments where affordability or convenience is a challenge, the initiative seeks to address the issue of limited access, particularly for girls and women in educational institutions and workplaces. A mobile application complements the initiative by assisting users in locating nearby vending machines and checking their stock availability. Furthermore, efforts are underway to raise awareness about the importance of sanitary pads and normalize their usage, encouraging support from both men and women for this initiative.

This paper introduces the development of an Automatic Health Machine (AHM) designed to address the challenges posed by health crises like the COVID-19 pandemic, particularly in both rural and urban areas. By leveraging Internet of Things (IoT) technology and Artificial Intelligence (AI), the AHM enables individuals to access medical services remotely. It offers comprehensive virtual health assessments, online consultations with healthcare professionals, and facilitates the scheduling of swab tests or ambulance services based on the patient's

requirements. Moreover, the AHM is capable of dispensing swab tests and essential medications, while also generating electronic prescriptions for future use. Access to AHM services is facilitated through the use of a "Smart Health Card."

Aligned with the Sustainable Development Goals (SDG3) advocated by the United Nations, the AHM aims to improve the health and well-being of individuals of all ages, particularly during health crises such as pandemics or epidemics. Collaborative efforts with industries and healthcare institutions were undertaken to understand healthcare needs during and post-pandemics. Virtual workshops involving COVID-recovered patients, frontline healthcare workers, and medical professionals were conducted to gather valuable insights. Healthcare experts endorse the AHM's viability for implementation in areas lacking immediate medical resources, leading to patents being granted in both India and the USA.

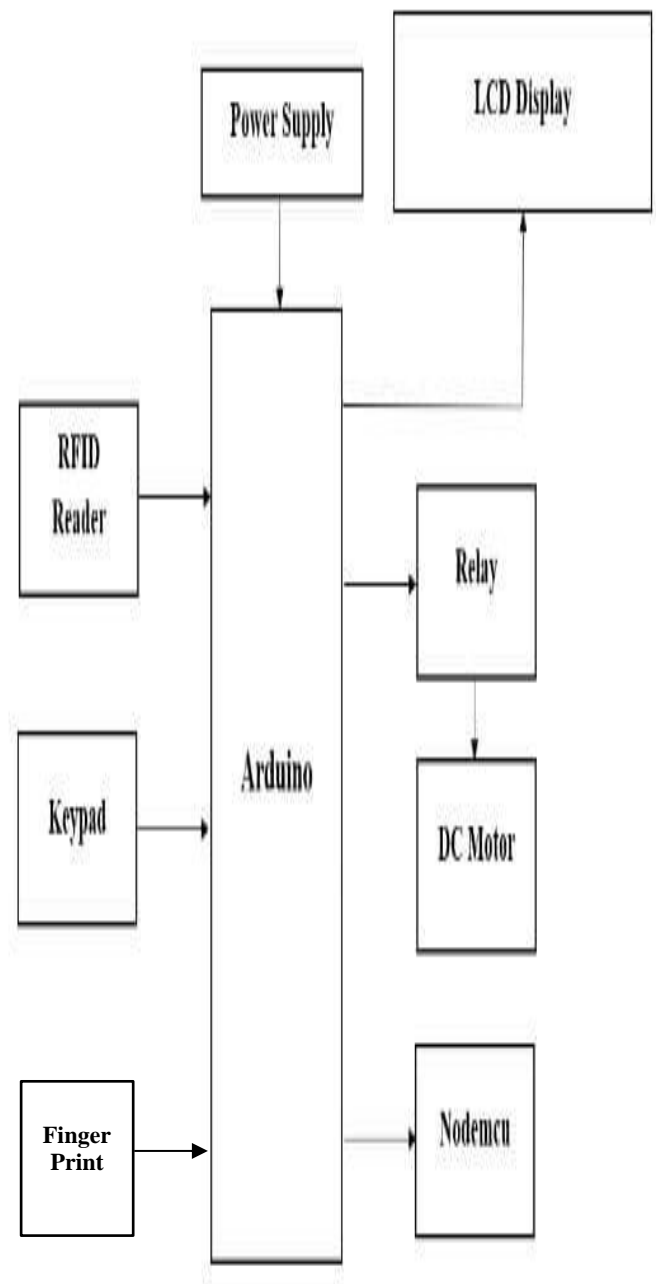
The analysis process involves dissecting complex topics or substances to gain a deeper understanding. In engineering, this entails examining requirements, structures, mechanisms, and system dimensions. It's an exploratory process that marks the beginning of the project lifecycle. During the Analysis Phase, the high-level Project Charter is broken down into more detailed business requirements, establishing the project's overall direction through the creation of project strategy documents. Gathering requirements involves a structured approach and specific techniques to capture, document, communicate, and manage requirements effectively. One crucial output of this phase is the Software Requirements Specification (SRS), which provides a comprehensive description of the system's behavior to be developed, including both software functions and non-functional requirements.

3.1 Hardware and Software Components

The Arduino Uno, powered by the ATmega328P microcontroller, serves as a versatile development platform with 14 digital I/O pins, 6 of which support PWM, along with 6 analog inputs. Its core components include a 16 MHz quartz crystal, USB connection, power jack, ICSP header, and reset button, providing all necessary support for microcontroller operations. Named "Uno" to coincide with the release of Arduino Software (IDE) 1.0, it has since become the reference model for Arduino development. Programming the Uno is simplified through the Arduino IDE, with the ATmega328 preloaded with a bootloader facilitating code uploads via the original STK500 protocol. Additionally, the ICSP header enables programming bypassing the bootloader using tools like Arduino ISP. Powering options include USB connection, AC-to-DC adapter, or battery, with automatic source selection. The recommended voltage range is 7 to 12 volts, ensuring stable operation and preventing damage to the board. Each of the digital pins can function as either input or output, supporting various applications through functions like `pinMode()`, `digitalWrite()`, and `digitalRead()`. The Uno also supports UART TTL serial communication through digital pins 0 (RX) and 1 (TX), with an ATmega16U2 managing USB communication. Communication capabilities extend to software serial communication on any digital pin, as well as support for I2C and SPI protocols. These features are facilitated by libraries like

Wire for I2C communication and the SPI library for SPI communication. Resetting the Uno can be accomplished through software, eliminating the need for physical button presses. This is made possible by connecting the ATmega8U2/16U2's DTR line to the reset line via a capacitor, allowing for coordinated resets during code uploads. Additional components like LCD displays, relays, and RFID readers can be integrated into Uno projects, expanding functionality. RFID readers such as the EM18 operate at 125 kHz and transmit unique IDs serially for further processing by microcontrollers or PCs. The Arduino Uno is a foundational tool for electronics projects, offering flexibility, ease of use, and compatibility with a wide range of components and applications

Figure 1: Block Diagram



4. CONCLUSION

Our main goal is to modernize the process of purchasing sanitary pads by ensuring easy accessibility and eliminating the necessity for discreet packaging. The introduction of the EASY PADS vending machine aims to provide convenient access to pads, particularly in emergencies or for individuals traveling, especially in rural areas. This system allows users to obtain pads through fingerprint recognition or a health card, thereby reducing any potential embarrassment women may feel while purchasing them. Additionally, our solution is not only efficient but also cost-effective compared to previous methods, as it automates the vending of pads without requiring manual intervention. By facilitating easy access to pads, our system contributes to preventing hazardous diseases like toxic shock syndrome (TSS) and uterine cancer. Looking ahead, future enhancements could involve integrating a disposal unit with the vending machine, simplifying both dispensing and disposal processes in a single unit to promote environmental cleanliness. Such innovations would not only benefit women but also serve as a valuable initiative for the government to support women's welfare.

ACKNOWLEDGEMENT

This project received support from the East West Institute of Technology. We express our sincere appreciation to our internal guide, Mr. Hemanth Kumar, Assistant Professor in the Department of Information Science and Engineering (ISE), for her invaluable guidance and significant contributions in enhancing the manuscript. We also acknowledge Dr. Suresh M B, Prof & Head of ISE Department, for his continuous support and mentorship throughout the project. Our sincere thanks go to Principal Dr. Channakeshavalu for his unwavering support and encouragement. We are indebted to colleagues for their constructive feedback on earlier versions of the project. Any shortcomings in the manuscript remain our responsibility and should not reflect negatively on the esteemed professionals mentioned above.

REFERENCES

- [1] International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 Issue: 06 | June 2020 www.irjet.net p-ISSN: 2395-0072 Arcot Aashish Arun Kumar1, Ramarangula Saideepak
- [2] International Journal of Current Research Vol. 11, Issue, 10, pp.7492-7497, October, 2019 DOI: https://doi.org/10.24941/ijcr.36931.10.201 Simranpal Kaur and 2Mrs. Bhupinder Kaur.
- [3] © 2019 JETIR June 2019, Volume 6, Issue 6 www.jetir.org (ISSN-2349-5162) Aditi Abhimane Department of E & TC(VLSI and Embedded System)Engineering JSPM's BSIOTR,Wagholi Pune 412207, Maharashtra, India Savitribai Phule Pune University,Pune.
- [4] International Journal of Engineering Applied Sciences and Technology, 2020 Vol. 4, Issue 12, ISSN No. 2455-2143, Pages 218-222 Published Online April 2020 in IJEAST (http://www.ijeast.com) V. M. Pimpalkar Dhanshri B. Marbonwar Asst. professor, Department of Electrical Engg. Student, Department of Electrical Engg Ballarpur Institute of Technology, Ballarpur, India Ballarpur Institute of Technology, Ballarpur, India Suraj G. Satpute Akash S. Lohkare Student, Department of Electrical Engg. Student, Department of Electrical Engg Ballarpur Institute of Technology, Ballarpur, India Ballarpur Institute of Technology, Ballarpur, India
- [5] Dragan S. Jankovic, Aleksandar M. Milenkovic and Andjelija I. Djordjevic" Improving the Concept of Medication Vending Machine in the Light of COVID- 19 and other Pandemics",2020.
- [6] Muhammad Niswar, Amil Ahmad Ilham, Elyas Palantei, Rhiza S. Sadjad, Andani Ahmad, Ansar Suyuti, Indrabayu, Zaenab Muslimin, Tadjuddin Waris, Puput Dani Prasetyo Adi" Performance Evaluation of ZigBee-based Wireless Sensor Network for Monitoring Patients' Pulse Status",2013.
- [7] Karat Thanaboonkong and JackritSuthakorn" A Study and Development on Robotic Drug Storing and Dispensing System in Drug Logistics for A Mid-Sized Hospital",2014.
- [8] Obaidulla-Al-Mahmud, Md. Kausar Khan, Rajdeep Roy, and Fakir Mashuque Alamgir" Internet of Things (IoT) Based Smart Health Care Medical Box for Elderly People",2020.
- [9] Knewron,"Any Time Medicine Vending Machine Project Concept",2013. [7] ZhardEMThe Smart Medication Vending Machine; 2009.
- [10] Hsieh, J.C, Yu, K.C, Chuang, H.C, Lo, H.C (2009), "The clinical application of an XML-based 12 lead structure report system Computers in Cardiology", pp. 533–536.
- [11] James Lim 2014, Programmable automatic pill dispenser, United Staes Patent,1(12).
- [12] Sarika Oundhakar, Department of Instrumentation Engineering, RAIT, Nerul, Navi Mumbai, India,," Automatic Medicine Vending Machine" Published by IJETSR,www.ijetsr.com ,ISSN 2394 – 3386 Volume 4, Issue 12, December 2017.