

QR CODE SCANNING-BASED MEDICINE VENDING MACHINE

Supriya Rajput,¹Zain Mulla², Ashutosh Kanbarkar³, Harsh Patil⁴, Smitesh Hattarki⁵

¹Assistant Professor, Maratha Mandal's Engineering College, Belagavi, Karnataka, India

²Student, Maratha Mandal's Engineering College, Belagavi, Karnataka, India

³Student, Maratha Mandal's Engineering College, Belagavi, Karnataka, India

⁴Student, Maratha Mandal's Engineering College, Belagavi, Karnataka, India

⁵Student, Maratha Mandal's Engineering College, Belagavi, Karnataka, India

Abstract - The QR Code Scanning-Based Medicine Vending Machine is an innovative solution designed to provide convenient access to over-the-counter medications, supplements, and health related products. The Medicine Dispenser is a machine which dispenses or gives the medicine based on the authentication of the user, which was registered by to user in machine. This machine will give medicine which is in QR-Code prescription which was provided by the user's doctor and also the quantity of medicine is also determined by the user's choice. This machine will dispense medicine according to the user prescription provided by the user's doctor. The main goal of the dispensing machine is to provide the medicine to the users 24/7 so it can help the village people Who are far away from the hospital or the clinic to buy the medicine and also it can be installed like an ATM machine so it is easy to use by the people even though if they cannot read and write. The medicine can be replaced by the administrator of the machine by time to time based on the expiration date or if it is empty the machine will alarm the administrator to refill the machine through SMS or telecom messenger.

1.INTRODUCTION

In this project based seminar on QR code scanning-based medicine vending machines in a healthcare setting can offer several benefits and innovations. The patients can quickly access their medications without waiting in long pharmacy queues. The automated process reduces waiting times and allows for 24/7 access to essential medications. By linking QR codes to specific prescriptions or patient profiles, the vending machine ensures that the right medications are dispensed to the right individual. This reduces the risk of human error often associated with manual dispensing. By automating medication dispensing, healthcare facilities can optimize staff resources, allowing pharmacists and healthcare professionals to focus on more complex patient care tasks. Integrating these machines with electronic health records (EHR) systems can provide real-time updates on medication dispensing, improving tracking and management of patient medications.

The aim of introducing QR code scanning-based medicine vending machines in healthcare is to revolutionize

medication dispensing by leveraging technology to enhance efficiency, accessibility, and safety. The project aims to streamline the process of medication distribution by providing patients with a convenient and automated way to access their prescribed medications. By using QR codes linked to patient profiles or prescriptions, individuals can quickly and efficiently retrieve their medications from vending machines without the need for extensive waiting times or interactions with pharmacy staff and targets improved patient safety and medication accuracy. By linking QR codes to specific prescriptions or patient records, the vending machines can significantly reduce the risk of medication errors associated with manual dispensing processes. This automation helps ensure that the right medications are dispensed to the right patients at the right time, enhancing overall patient safety and reducing adverse drug events.



Fig 1.1 Prototype

1.1 Technology Assessment

Evaluate additional features such as medication selection, payment options, and user interface. Assess vendor support, including training, troubleshooting, and ongoing maintenance services. Assess vendor Evaluate the reliability and uptime of vending machine machine hardware and software.

1.2 Cost-Benefit Analysis

Determine initial costs, including procurement of vending machines, installation, and setup fees. Consider Estimate potential cost savings from reduced labor requirements

(e.g., fewer staff needed for medication dispensing). Consider ongoing operational costs, such as maintenance, servicing, and restocking of medications.

2. System Architecture

The system architecture of the QR Code Scanning-Based Medicine Vending Machine is designed to provide an efficient and automated solution for dispensing medicines.

At its core, the system utilizes an embedded QR code scanning module to read prescriptions encoded in QR codes, which are linked to patient profiles or doctor-provided prescriptions. The scanned data is transmitted to an ATMEGA328 microcontroller, which acts as the central processing unit, controlling the entire system. The microcontroller interfaces with various components, including relay drivers for operating the dispensing mechanism, an LCD display for user feedback, and sensors such as IR sensors to detect user interaction. A servo motor is employed to physically dispense the medicines, while a buzzer provides alerts during the dispensing process or in case of errors. The system is powered by a regulated power supply unit that delivers +5V and +12V to the components, ensuring stable operation. The communication between the QR scanner and the microcontroller is facilitated through a UART/Serial connection, and the software is programmed using Arduino-based code to manage the scanning, dispensing, and user interaction processes. The methodology for developing the QR Code Scanning-Based Medicine Vending Machine follows a structured approach. It begins with the initiation phase, where project goals, scope, and objectives are defined, followed by the planning phase, which involves establishing system requirements, stakeholder involvement, and timelines. The designing phase focuses on creating detailed specifications for hardware and software, user interface designs, and prototypes. In the development phase, hardware components such as the QR scanner, microcontroller, relay, and sensors are integrated, and the system is programmed and tested for functionality. The control phase ensures final testing, quality assurance, and regulatory compliance before deployment. Once the machine is built and installed, testing and validation are conducted to ensure reliability, functionality, and performance. Risk monitoring and control are implemented throughout the project lifecycle to address potential challenges such as hardware malfunctions, data security breaches, and user resistance. Finally, the system is maintained through regular monitoring, medicine refills, and software updates to ensure its continued efficiency and effectiveness. This comprehensive methodology ensures the successful implementation of the vending machine, addressing user needs, technical constraints, and compliance requirements.

2.1 Operational Research

The operational principle of the QR Code Scanning-Based Medicine Vending Machine revolves around automation, user authentication, and efficient medicine dispensing. The process begins when a user scans a QR code, which contains their prescription details provided by a doctor. The QR code scanning module reads the encoded data and transmits it to the microcontroller (ATMEGA328), which acts as the central processing unit of the system. The microcontroller processes the data, verifies the prescription, and determines the type and quantity of medicine to be dispensed. Once the prescription is authenticated, the microcontroller activates the relay system to control the dispensing mechanism. The servo motor operates to release the prescribed medicine, while the LCD display provides real-time feedback to the user, such as instructions and status updates. If the medicine is unavailable or an error occurs, the buzzer alerts the user. The system is powered by a regulated power supply unit, ensuring stable operation of all components. Additionally, sensors like IR sensors detect user interaction and ensure the proper functioning of the machine. The machine is designed to operate 24/7, making it accessible to users in remote areas or those requiring medications outside regular pharmacy hours. The administrator is notified via SMS or telecom messenger when the machine needs refilling or when medicines are nearing expiration. This operational principle ensures convenience, accuracy, and efficiency in medicine dispensing, while also addressing accessibility and safety concerns.

2.2 Firmware

The software implementation of the QR Code Scanning-Based Medicine Vending Machine is primarily based on Arduino programming using C/C++ code. The microcontroller, ATMEGA328, is programmed to manage the entire operation of the vending machine, including QR code scanning, user authentication, medicine dispensing, and system alerts. The software begins by initializing the components, such as the QR code scanner, LCD display, servo motors, relays, and buzzer. It also sets up the input and output pins for the microcontroller to interact with these components. The main functionality of the software involves reading the QR code data through the scanner, which is connected to the microcontroller via a UART/Serial interface. The microcontroller processes the scanned data to verify the prescription and determine the required medicine and quantity. Based on the input, the software triggers the corresponding relay to activate the servo motor, which dispenses the medicine. The LCD display provides user feedback, such as instructions to scan the QR code, medicine availability, and collection status. The buzzer is programmed to sound alerts in case of errors or to notify the user when the medicine is ready for collection.

3. Methodology

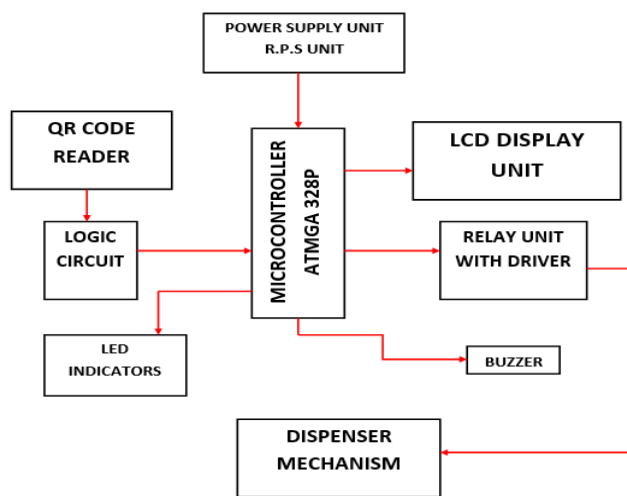


Fig 3.1 Block Diagram

3.2 PCB Layout

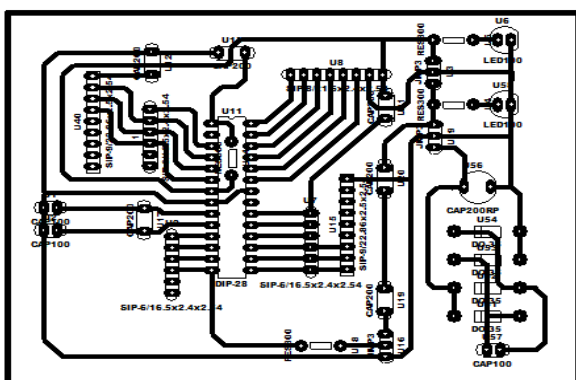


Fig 2.4 PCB Layout

4. Results And Discussion

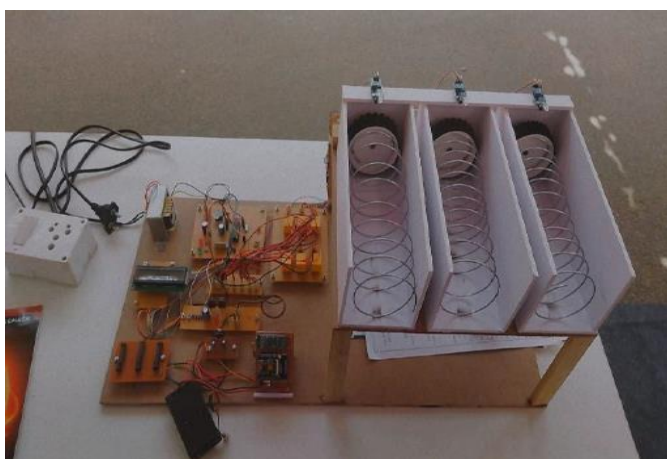


Fig .4 Final resultant

The implementation of a smart library management system yields improved efficiency through automation and digitization, enhancing user experience by offering personalized recommendations and convenient access to digital resources. Datadriven decision-making enables better resource allocation and service enhancements, leading to cost savings and optimized operations. Smart libraries serve as hubs of community engagement, fostering lifelong learning and cultural enrichment. Challenges such as technological barriers and data privacy concerns must be addressed to maximize benefits. Ongoing maintenance, staff training, and user support are essential for sustained success. Overall, smart libraries represent a transformative shift , aligning with the demands of the digital age while preserving the core mission .

4.1 CONCLUSION

In conclusion, the implementation of a medicine vending machine represents a significant advancement in the way libraries operate and serve their communities. By leveraging cutting-edge technology and innovative solutions, vending machine offer a host of benefits to users, doctors, and staff alike.

The integration of features such as RFID technology, digital resources, personalized recommendations, and interactive interfaces enhances the overall user experience, making it more convenient, efficient, and engaging to access and utilize machine services.

From a business perspective, vending machine present opportunities for cost savings, revenue generation, market expansion, and strategic partnerships. By adopting a robust business model, coupled with effective marketing and promotion strategies,

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