



Smart Pharmacy System: RFID-Based Medicine Dispensing with Automated Payment and Delivery

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ABSTRACT: Medicine plays an important role in human's life for every situation. An automated medical system is introduced to reduce the man power time and energy. It is similar to an ATM through which we get the required money at any time & any place. The same system is followed for the pharmaceuticals also. Medicines for B.P, diabetics, cold, fever, headache, and first aid medicines like bandage, cotton, ointments, and other routinely used tablets can be obtained. When RFID card is inserted, the details of the particular user are read by the RFID reader and displayed. After the identification of the valid person, list of medicines will be displayed on the TFT display, then user selects the required medicines by entering the corresponding number of selected medicines by using the keypad. After entering the required list, the amount will be calculated according to the medicine and their quantity. The amount will be deducted from the RFID card and immediately the transaction details will be sent through GSM to the user. After payment deduction the selected medicine are delivered automatically from the system. For this delivery system the microcontroller uses a slider arrangement with the help of servo motors which provide rotational mechanism.

KEYWORDS: RFID Technology, Automated Medicine Dispensing, Smart Healthcare System, GSM Communication, Servo Motor Mechanism, Cashless Payment System, IoT-Based Healthcare

I. INTRODUCTION

In today's fast-paced world, timely access to medicines is crucial for maintaining health and well-being. Traditional methods of purchasing medicines often involve long queues, waiting times, and dependency on pharmacy hours, which can be inconvenient, especially during emergencies. To address these challenges, an automated medical dispensing system has been developed, functioning similarly to an ATM. Just as an ATM provides cash on demand, this system allows users to obtain essential medicines anytime and anywhere, reducing manual effort and saving time. This system is designed to dispense a variety of medicines, including those for chronic conditions like blood pressure and diabetes, common ailments such as cold, fever, and headache, as well as first aid supplies like bandages, cotton, and ointments. Users authenticate themselves using an RFID card, which the system reads to verify the identity of the person. Upon successful identification, a list of available medicines is displayed on a TFT screen, from which users can select the required items using a keypad. The system then calculates the total cost based on the selected medicines and their quantities, deducts the amount from the user's RFID card, and sends a transaction confirmation via GSM. The selected medicines are then delivered automatically through a mechanical slider arrangement controlled by servo motors, ensuring precise and efficient dispensing. This innovative approach not only enhances convenience and accessibility but also minimizes human intervention, making healthcare support more reliable and user-friendly.

OBJECTIVES

1. Provide 24/7 Access to Medicines

Enable users to obtain essential medicines and first aid supplies at any time, eliminating dependency on pharmacy hours.

2. Reduce Human Effort and Waiting Time

Automate the process of medicine dispensing to save time and minimize manual intervention.



3. Ensure Secure and Personalized Transactions

Use RFID-based authentication to verify users and maintain secure, individualized access to the system.

4. Simplify Medicine Selection and Payment

Display available medicines on a TFT screen, allow easy selection via keypad, calculate the total cost, and automatically deduct payment from the user's RFID card.

5. Provide Real-Time Transaction Notifications

Send immediate transaction confirmation to users via GSM, ensuring transparency and reliability.

6. Automate Precise Medicine Delivery

Use servo motor-controlled slider mechanisms for accurate and efficient dispensing of the selected medicines.

7. Promote Efficient Healthcare Management

Reduce dependency on manual labor in pharmacies and improve accessibility to essential medicines in emergencies.

II. LITERATURE REVIEW

Penna et al. (2017) – Design and Implementation of Automatic Medicine Dispensing Machine (2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology, RTEICT 2017) presents a prototype automatic medicine dispenser using microcontrollers and RFID for identification and servo-based dispensing. This work demonstrates feasibility of a fully automated system to dispense medicines based on user authentication.

Tank, Warriar & Jakhiya (2017) – Medicine Dispensing Machine Using Raspberry Pi and Arduino Controller (IEEE Conference on Emerging Devices and Smart Systems, March 2017) describes a medicine vending solution using embedded controllers (Raspberry Pi/Arduino) for selection and dispensing, highlighting integration of microcontrollers in automated medical systems.

Bhagya Shree & Chandra Shekar (2015) – Automated Medication Dispensing System (2015 IEEE) explores an early implementation of automated medication dispensers focusing on controlled release and access of medication, an important foundation for later vending-style systems.

Bai & Kuo (2016) – Medication Adherence by Using a Hybrid Automatic Reminder Machine (IEEE International Conference, 2016) investigates automation for medication adherence, focusing on timed dispensing and reminders—key components in comprehensive automated systems.

Sarika Oundhakar (2017) – Automatic Medicine Vending Machine highlights a microcontroller-based medicine vending prototype where users can select and receive medicines automatically, similar in concept to the ATM-style system.

Paruvathavardhini et al. (2021) – Automatic Vending Machine using RFID discusses RFID-based automatic vending, demonstrating how RFID enhances secure selection and payment mechanisms in vending applications, relevant to medicine-dispensing automation.

Patlewar et al. (2025) – Automated RFID-Based Solar-Powered Vending Machine for Medical and Stationary Supplies proposes a solar-integrated, RFID-enabled vending machine that dispenses essential supplies with energy efficiency, indicating modern expansions of automated dispensing.

III. PROBLEM STATEMENT

In modern healthcare, timely access to essential medicines is critical for effective treatment and patient well-being. Traditional methods of obtaining medicines require visiting pharmacies, which can be time-consuming, especially during emergencies or outside regular working hours. Additionally, manual dispensing in hospitals and clinics often depends on staff availability, leading to delays, human errors, and inefficient use of resources.

Many patients with chronic conditions, such as diabetes and hypertension, require regular medication. Delays in accessing these medicines or missing doses can adversely affect their health. Similarly, availability of first aid supplies during unexpected situations is often limited. Current systems lack automation, real-time monitoring, and instant payment methods, which can compromise both efficiency and user convenience.



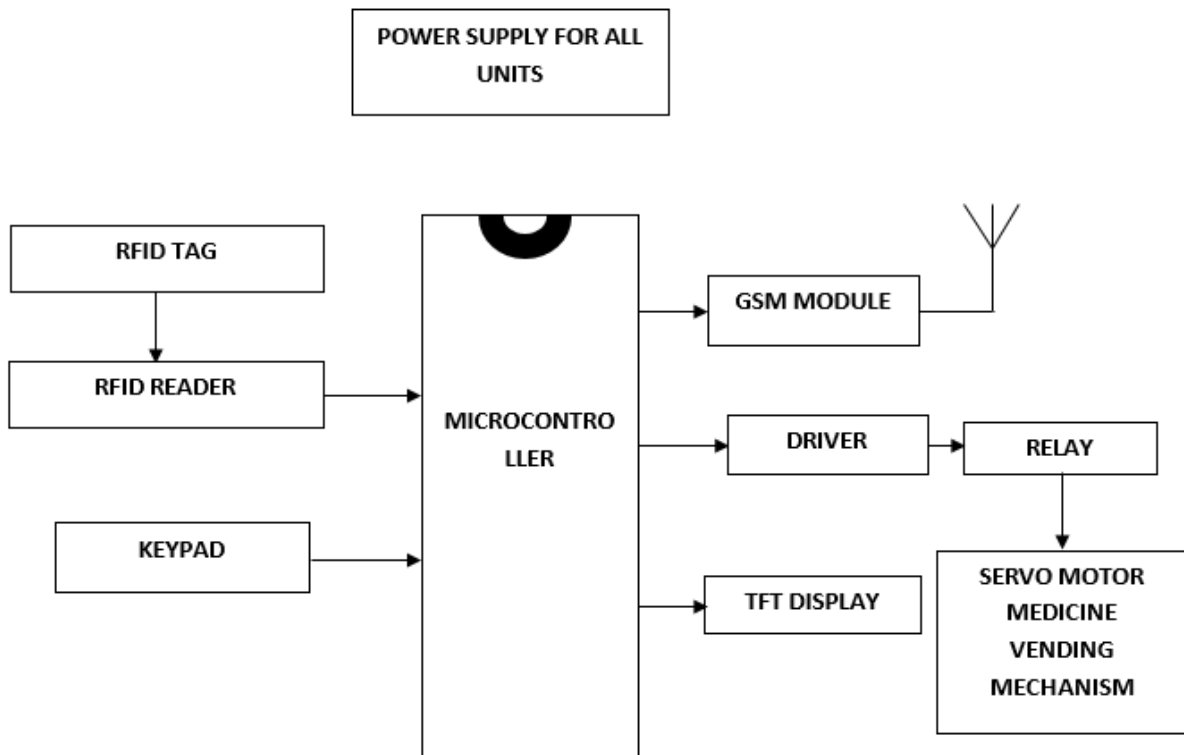
EXISTING SYSTEM

1. Manual Dispensing: Medicines are dispensed by pharmacists or staff, which requires physical presence and manual verification of prescriptions or identity.
2. Limited Operating Hours: Users can only access medicines during the pharmacy’s working hours, causing delays in emergencies.
3. Human Errors: Manual selection and dispensing of medicines can lead to mistakes, such as wrong dosage, incorrect medicine, or miscalculation of billing.
4. Payment Constraints: Transactions often require cash or card payment at the counter, which can be inconvenient and time-consuming.
5. No Real-Time Tracking: There is usually no automated system to monitor medicine stock, transaction details, or consumption patterns in real time.
6. Dependency on Staff: The process heavily depends on the availability and efficiency of personnel, making it less reliable during high-demand periods.

PROPOSED SYSTEM

The proposed system is an Automated Medical Dispensing System designed to provide 24/7 access to essential medicines and first aid supplies, functioning similarly to an ATM. Users authenticate themselves using an RFID card, which is read by the system to verify their identity. Once validated, a TFT display shows the available medicines, and the user selects the required items using a keypad. The system then calculates the total cost and automatically deducts the amount from the user’s RFID card, while a GSM module sends a real-time transaction confirmation to the registered mobile number. The selected medicines are dispensed accurately through a servo motor-controlled slider mechanism, reducing manual errors and ensuring efficient delivery. By combining automation, security, and convenience, this system improves accessibility, minimizes human effort, and ensures reliable medicine dispensing at any time.

IV. BLOCK DIAGRAM





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