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Customizable Smart Pill Dispenser

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Abstract - Medication adherence is essential for achieving optimal health outcomes, yet it remains a persistent challenge. Poor adherence can lead to ineffective treatments, adverse health outcomes, and higher healthcare costs. Traditional dispensers lack the adaptability and remote monitoring capabilities needed by diverse users. This paper introduces a customizable smart pill dispenser integrating IoT, sensors, and mobile applications. The device provides automated reminders, real-time tracking, remote management, and customizable compartments and schedules. It also enables multilingual interfaces, secure data sharing, and actionable insights for caregivers. This holistic system promotes proactive healthcare, reduces medication errors, and enhances patient outcomes.

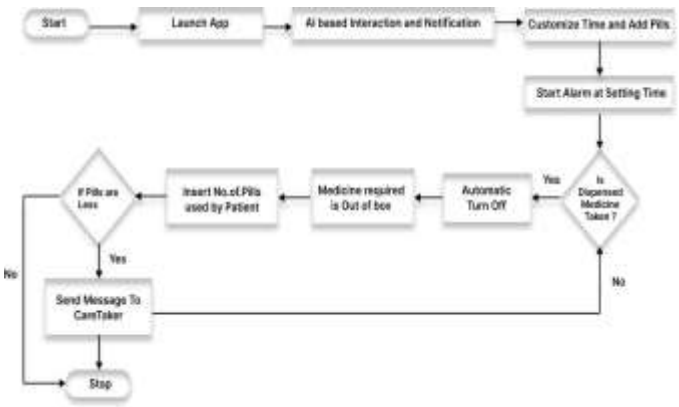
***Key Words*:** Medication adherence, smart pill dispenser, IoT, real-time monitoring, remote management, healthcare technology.

1.INTRODUCTION

Medication adherence is vital to treatment success and patient health. Yet, many patients struggle with complex schedules, forgetfulness, and lack of support. Conventional dispensers often lack real-time capabilities and cannot handle personalized regimens. Emerging smart devices offer automation and data-driven insights, but still fall short in flexibility and usability. This paper presents a fully customizable smart pill dispenser that integrates IoT, smart sensors, and mobile applications, allowing for flexible schedules, real-time tracking, and caregiver notifications.

2. Problem Statement

Current dispensers are too rigid and lack real-time and remote monitoring. Patients face challenges in adhering to complex regimens, resulting in poor outcomes. A customizable dispenser integrating IoT and mobile technology can enhance adherence by automating



reminders, enabling alerts, and sharing adherence data with caregivers.

3. Proposed Work

The proposed dispenser supports personalized medication schedules with secure fingerprint authentication, real-time tracking, and a mobile app for remote monitoring and control. The system includes alerts for missed doses, adherence reports, and caregiver communication features.

4.Design and Implementation on pill dispenser

5.1 System Overview

The system uses an Arduino Mega, RTC, fingerprint scanner, buzzer, LCD, keypad, IR sensor, and vibration motor. It ensures secure and timely medication dispensing, triggered by a fingerprint-authenticated schedule.

5.2 Fingerprint Authentication and Medicine Dispensing

Upon fingerprint input, a buzzer alerts the user. Validated input stops the buzzer and dispenses the medicine. Unauthorized access is blocked.

Table -1: Various Components of the proposed model

Component	Functionality
Arduino Mega	Microcontroller for processing instructions
RTC	It is the actual clock that shows the current timestamp
I2C Module	Used to change serial data to parallel data for LCD Display
Display	Used for displaying information to the user
Buzzer	A speaker used as an alarm for the user
Keypad	Used for taking input from the user
Scanner	Used to authenticate user fingerprint
Vibration Motor	Used to dispense medicine
IR Sensor	Used to validate whether medicine is dispensed or not

The system's keypad allows the admin to input various commands to manage the dispenser and control its functionality. These commands are outlined below in **Table2**.

The LCD display shows messages to guide the user in operating the system. The system's simplicity allows for easy input via the keypad, where the admin can add, update, or delete medication schedules

Table 2: Admin can use keypad to add, update, or delete schedules

Command	Description
A	Add new dose of medicine
C	Update time slots of existing dosage
D	Delete slots

5. CONCLUSIONS

The smart pill dispenser presents a robust solution to medication adherence challenges. Its customizable, secure, and real-time features empower both patients and caregivers. The integration of IoT and mobile applications ensures proactive healthcare delivery, reducing errors and improving health outcomes.

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