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All Time Medicine (ATM) : A Smart 24/7 Emergency Medicine Dispenser with an SOS Emergency System

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Abstract:
Nowadays, we see that India's population is growing day by day, and there is a **lack of emergency medicines** in rural and remote areas as well as in public places such as Bus stations, Railway stations, Hostels, Colleges, and residential Societies.
This paper presents **ALL-TIME MEDICINE (ATM)** – a **Smart 24/7 Emergency Medicine Dispenser with an SOS Emergency System** that provides instant access to essential medicines during emergencies.
It operates using a Raspberry Pi micro controller, which controls a **servo motor, LCD display, and IR sensors** to dispense the selected medicine safely at the press of a button.
By using **IoT modules such as ESP8266 or SIM800L** for cloud monitoring, the system sends **alert SMS notifications** to nearby **pharmacy stores** when a slot becomes empty, and the data is automatically updated to the cloud for the administrator & stock of medicine will be managed.This machine is user-friendly, and a non- technical person can easily operate it by simply pressing a push button. It also includes an SOS emergency button that can be used anytime and anywhere during a medical emergency.

Keywords: Emergency Medicine ATM, Smart Healthcare, IoT-Based Medicine Dispenser, Raspberry Pi, SOS Alert System, Servo Motor, IR Sensor, Cloud Monitoring, ESP8266, SIM800L, Automated Medicine Vending Machine, Remote Healthcare Support, 24/7 Medicine Access, Real- Time Inventory System.

1. INTRODUCTION

In today's rapidly growing population, timely access to essential medicines during emergencies has become a major concern, especially in rural and remote areas where medical facilities are limited. Even in public locations such as bus stations, railway stations, hostels, colleges, and residential societies, emergency medicines are not readily available at all times. The unavailability of pharmacy services during late hours often results in delayed medical assistance, which can lead to serious health complications.

To overcome these challenges, smart healthcare solutions such as automated medicine dispensers are gaining importance. The proposed system, **ALL-TIME MEDICINE (ATM)**—a Smart 24/7 Emergency Medicine Dispenser with an SOS alert system—aims to provide immediate access to critical medicines anytime and anywhere. By integrating modern technologies like Raspberry Pi, IoT modules, and cloud-based monitoring, this machine ensures user-friendly, fast, and reliable medicine dispensing during medical emergencies.

The main motive of creating such a ATM is to use them at places like Railways station, Bus stand , Hostels, Colleges, Societies where the people can go for any emergency required tablets for fever, cold ,cough, vomiting , hypertension, ORS (Oral Re hydration Solution), glucose ,first aid kits requirements like ointments , cotton, bandages etc….. **No requirements of doctors prescription.** This is a very unique from all the below literature survey mentioned.

2. LITERATURE SURVEY

IOT based intelligent pillbox (any time medicine) [1]

Medicines is an essential part in looking after well being, averting over seeing, interminable conditions and curing sickness. Unsurpassed Medicine (ATM) is a machine which conveys the medication in crisis cases and guarantee accessibility of medications 24x7. ATM will be extremely valuable in sparing life if there should arise an occurrence of a mischance on parkways, remote ranges, provincial territories and spots where therapeutic stores are not inside the compass in the event of crisis.

2.1 Design and implementation of IOT based automatic medicine dispenser [2]

An Automatic Medicine Dispenser is a modern technological solution for managing medication adherence. It is designed to automate the process of medication management and to ensure that patients take the right medications at the right time. The system is a programmable device that dispenses medication doses at specific times of the day, allowing patients to adhere to their prescribed medication regimen. The dispenser can also track and record the medication history of patients, which can be accessed by healthcare professionals to monitor adherence and adjust treatment plans accordingly. The automatic medicine dispenser is equipped with advanced features that make it user- friendly and efficient. The system can be customized to meet the specific needs of patients, including medication types, dosages, and schedules. It is also capable of storing multiple medications, making it ideal for patients with complex medication regimens. The dispenser can programmed to alert patients or caregivers when it is time to take medication, and it can also provide audio and visual prompts to help with compliance. One of the major benefits of an automatic medicine dispenser is that it reduces medication errors. The device ensures that patients take the correct dosage of medication at the right time, which can prevent under or overdosing. Patients who forget to take their medications or are non-adherent to their medication regimen can benefit from the system's reminders and prompts. This can lead to better health outcomes and reduce the risk of complications associated with chronic conditions. Another advantage of an automatic medicine dispenser is that it enhances patient safety. The system is designed to prevent medication errors, reduce the risk of adverse drug reactions, and ensure that patients receive their medications in a timely and consistent manner. In conclusion, an automatic medicine dispenser is a valuable tool for managing medication adherence and improving patient outcomes. The device is user-friendly, efficient, and customization, making it ideal for patients with complex medication regimens. Its advanced features help reduce medication errors, improve medication adherence, and enhance patient safety, making it a crucial tool in the management of chronic health

conditions

2.2 IOT based intelligent pill dispenser for elderly people [3]

In exponentially modernizing world, the growing technologies and lifestyle aids health sectors. In 2013. 13% of the world's population was 60 years of age or older, which has increased from 8% in 1950. Over the next forty years, it will grow more quickly, reaching 21% in 2050. Elderly patients with continuing loss of memory usually forget to take medicines at the right time. Treatment is considered unusable when the patient neglects to take their medication at the appropriate time as directed by their doctor. Therefore, this research presents the implementation of IoT based intelligent pill dispenser for users who should take their medicine at the proper time. The system consists of a solid prescription intelligent pill dispenser and a mobile application for configuring and monitoring it. Added features have been included to the smart medicine box such as high security, emergency alert through SMS, automatic data collection and pill details. The mobile application performs person authorization using a username and password, which is based on the Internet of Things (IoT). It monitors the parameters such as intake of medication time, pills and location details, and user and caretaker data. Additionally, the system notifies users via mobile notifications when it's time to take their medications as well as through the visuals and sounds the dispenser emits. The parameters are recorded, uploaded to the cloud and reviewed by the clinicians using the IoT system. This helps clinicians to gain knowledge about their patient's health conditions for a further treatment analysis. The feature of uploading the patient details and medical records avoids the difficulties of carrying the prescription and medical records and hence patients can live independently.

2.3 Any Time Medicine (ATM) vending machine for medicine self-dispensing [4]

Medicines are a very important aspect for the overall me well-being of a person. They are essential in maintaining health, preventing illness, managing chronic conditions and curing disease. But the existing social status have caused a lot of health inequalities. This project helps in providing medicines for common health issues as well as for first aid. It displays the medicines present so that the user can select the medicines according to their requirement. The major advantage of this vending machine is that it can be implemented in public places such as Malls, National Highways, Railway Stations, Bus Stand and many other places providing access any time 24/7. The proposed system will be beneficial in saving life in rural areas, remote areas where medical stores remain unavailable in cases of emergency. This venture comprises of a processor which controls the other sub frameworks such as RFID, GSM, pharmaceutical allocator, and stock control.

2.4 Digital ATM for medicine [5]

This paper presents the design and implementation of a Digital ATM for Medicine aimed at providing access to essential medications in remote areas where traditional medical stores are not readily available. The Digital ATM for Medicine is designed to operate 24/7, storing various types of medications such as painkillers, cold, cough, fever, and dizziness relievers, and dispensing them according to user requirements.

2.5 Smart medicine dispenser (SMD) [6]

This paper presents a Smart Medicine Dispenser (SMD) prototype. The main purpose of this system is to help the patients, primarily seniors, take their medications on time in an easy way without the possibility of missing pills, also reduce the risk of over or under dosing accidentally. Not taking medications correctly can have serious consequences such as delayed recovery, illness and even death. The smart medicine dispenser (SMD) could solve such problems by informing and alerting the patients

to take the appropriate dose at the right time. Also, it provides direct communication between the patients and the caregivers as it will immediately notify the caregiver in case the patient missed his/her pill. In addition, SMD provides the user with a touch interface available as an application on their smartphone which will allow them to remotely manage and control pill schedules and usage data.

3. DESIGN AND IMPLEMENTATION

Figure 3.1 Block diagram of the system

1. System Design

a. The proposed **All Time Medicine (ATM)** system is designed as a microcontroller- based kiosk that dispenses over-the- counter (OTC) medicines on user request and supports an SOS emergency alert.

b. A **Raspberry Pi (or Arduino in prototype)** is selected as the central controller. It interfaces with:

- **Push buttons** for medicine selection (e.g., Fever, Cold, First Aid, SOS).
- **Temperature sensor (DHT11/LM35)** to monitor internal cabinet temperature for safe medicine storage.
- **IR sensor** to detect successful dispensing or empty slot.
- **LCD display** to guide the user through options and show status messages.

c. A **servo-based dispensing mechanism** is used instead of a complex vending motor. Each button corresponds to a servo movement that pushes one strip/packet of medicine through a slot. The entire system is powered by a **5 V supply (USB / battery / solar)** to allow 24×7 operation.

2. Hardware Implementation

a. The **Raspberry Pi** is mounted on a small panel inside the prototype cabinet.
Push buttons are placed on the front panel and wired to the GPIO/digital input pins using internal pull-up configuration (one terminal to input pin, the other to ground).

Figure 3.2 : Raspberry pi

b. The **servo motor** is fixed near the medicine slot on a cardboard/acrylic frame. Its shaft is connected to a small arm/roller that physically pushes a single medicine strip when it rotates by a fixed angle (e.g., 90° or 180°). The servo signal pin is connected to a PWM-capable pin, and its power pins to 5 V and GND.

Figure 3.3: Servo Motor

c. The **temperature sensor** and **IR sensor** are placed inside the cabinet. The temperature sensor output is fed to an analog/digital input; the IR sensor output goes to a digital input used to confirm whether the medicine has actually dropped. The **LCD display** is wired over I²C or 4- bit mode to show menu options, errors (e.g., "OUT OF STOCK"), and SOS status. All modules share a common ground with the controller.

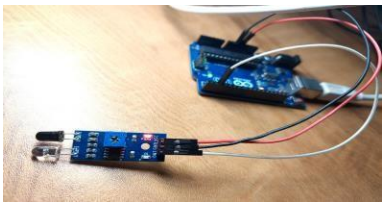

Figure 3.4: Sensors

3. Software Implementation

a. The control program is developed in **Python (for Raspberry Pi) or Arduino C/C++ (for Arduino prototype)**. At startup, the system initializes GPIO pins, servo library, LCD library, and sensor interfaces, then displays the main menu with medicine categories and SOS option.

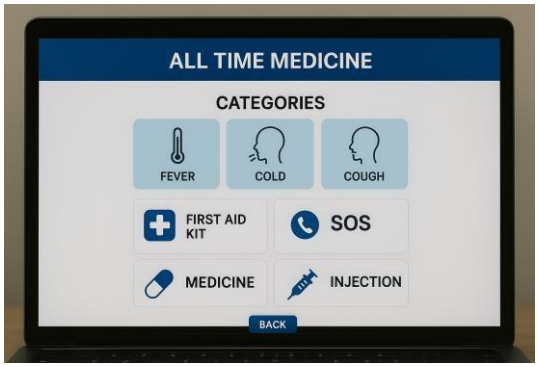

Figure 3.5: Display Screen

b. In the main loop, the software continuously scans the **push-button inputs**. When a button is pressed, the corresponding routine is triggered:

- Check **stock and sensor status** (IR sensor, optional database flag).

- If available, rotate the servo by the predefined angle to dispense one dose and then return it to the home position.
- Read the IR sensor to verify successful dispensing; on failure, show an error message on the LCD.

c. If the **SOS button** is pressed, the program bypasses normal dispensing and triggers an emergency routine (e.g., display "EMERGENCY", log event, optionally send alert via GSM/IoT in future work). After each transaction, the controller updates the internal stock count, returns to the home screen, and waits for the next user input.

Flow Chart :

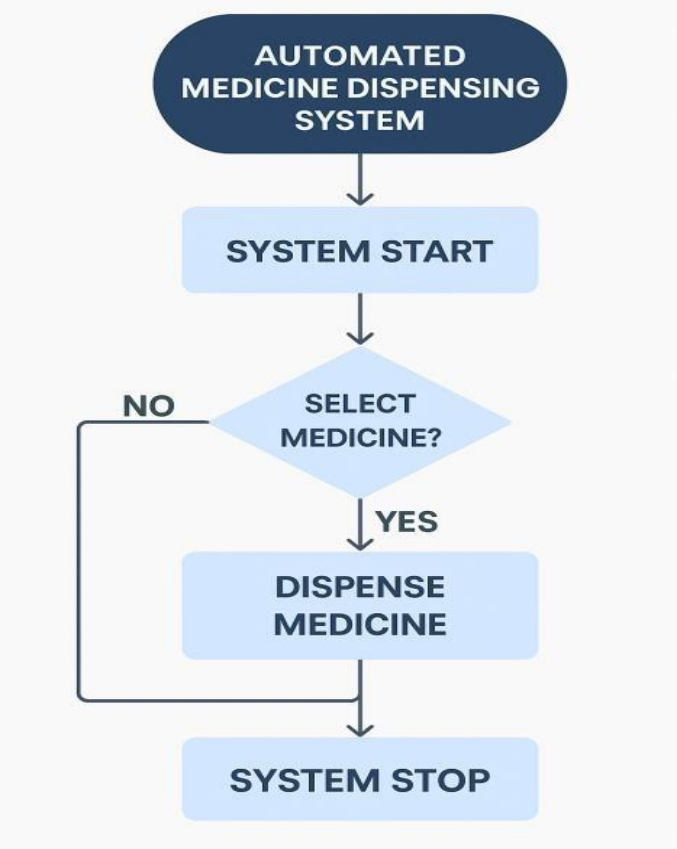

Figure 3.6 Working Flowchart

4. INTEGRATION & TESTING

The hardware and software modules are integrated and tested under different conditions such as low stock, power variation, and false button triggering. The dispensing accuracy, response time, and reliability are evaluated. SOS button functionality is verified for emergency handling and legal compliance

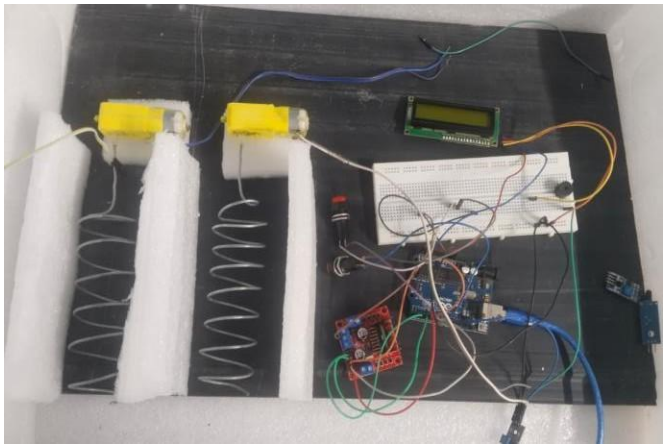

Figure 4.1: Sample setup of all time medicine

5. SAFETY & LEGAL COMPLIANCE

The machine is configured to dispense only **OTC (Over-the-counter)** medicines legally permitted without prescriptions. Misuse of SOS emergency button for prank or false alert is addressed referencing **IPC Section 182 & 505**, which define penalties for causing false alarms.

6. CONCLUSION

The **All Time Medicine (ATM)** system is designed to make medicines available anytime, especially during emergencies when medical stores are closed or far away. It is very useful for places like rural areas, highways, bus stands, railway stations and hostels where quick access to medicines can be difficult. The system uses **Raspberry Pi automation, sensors, a servo motor, and simple push-button controls** to dispense medicines easily and quickly without needing a pharmacist. It also includes an **SOS emergency button** that can help people in urgent situations. This prototype is reliable, easy to use, and can help save lives by reducing the time needed to get emergency medicines. In the future, we can upgrade this system with features like **online digital payments, IOT, real-time monitoring, and cloud- based stock management** to use it on a large scale.

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