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"Smart HealthCare For Hospital Management with Automated Expiry Notification"

Rithika N[1],Varshini S[2],Varshini M[3],Vidhyaa A S[4],Prof. Priyadharshan M[5].
U.G Student,Department of Computer Science and Engineering,Hindusthan College Of Engineering and Technology,Coimbatore,India[1].

U.G Student,Department of Computer Science and Engineering,Hindusthan College Of Engineering and Technology,Coimbatore,India[2].

U.G Student,Department of Computer Science and EngineeringHindusthan College Of Engineering and Technology,Coimbatore,India[3].

U.G Student,Department of Computer Science and EngineeringHindusthan College Of Engineering and Technology,Coimbatore,India[4].

Assistant Professor,Department of Computer Science and Engineering,Hindusthan College Of Engineering and Technology,Coimbatore,India[5].

Abstract

Effective pharmacy management is critical for ensuring timely access to medicines, preventing stock shortages, and reducing losses due to expired drugs. This paper presents *Smart Healthcare for Hospital Pharmacy Management with Automated Expiry Notification*, a web-based system designed to optimize pharmacy operations. The proposed application integrates inventory management, billing, and automated customer notifications into a single platform. It maintains a real-time medicine database with details such as stock levels, sales records, and expiry dates. The system generates automated alerts when stock is low and provides expiry reminders through SMS and voice calls, thereby enhancing patient safety and reducing medicine wastage. Billing operations are seamlessly linked to inventory updates, ensuring accurate transaction tracking. An interactive dashboard further supports pharmacists by offering detailed sales analytics, expiry reports, and notification logs. By automating routine tasks and improving communication between pharmacies and customers, the system promotes efficient stock control, minimizes errors, and strengthens healthcare service delivery.

Keywords: Smart HealthCare System, Voice Call Notification, SMS Alert System, Inventory Management, Real Time Database, Stock Checking, Web based Application.

Introduction

Pharmacy management is one of the most important aspects of hospital operations, as it directly impacts patient safety, treatment quality, and resource utilization. In many hospitals, medicine stock management and billing are still handled manually or with basic systems, which often leads to challenges such as inaccurate stock records, delays in billing, medicine wastage due to expiry, and lack of timely communication with patients. These problems not only increase operational costs but also affect the overall efficiency of healthcare services.

With the rapid growth of healthcare technology, there is an increasing demand for smart and automated systems that can support pharmacists in managing daily activities more effectively. A well-designed digital pharmacy management system can streamline the flow of work by integrating inventory management, billing, and customer communication in one platform. This ensures that pharmacists spend less time on repetitive administrative tasks and more time focusing on patient care.

One major challenge faced by pharmacies is the management of medicine expiry. Expired medicines are not only unusable but also pose a risk if dispensed accidentally. Many pharmacies lack an effective tracking system to remind patients about expiry dates of purchased medicines. Similarly, keeping patients informed about their medicine usage after purchase is also critical for safety and adherence. Automated notifications such as SMS and voice calls can play a key role in bridging this communication gap between pharmacists and patients.

The proposed project, *Smart Healthcare for Hospital Pharmacy Management with Automated Expiry Notification*, addresses these challenges by providing a web-based solution that combines inventory control, billing automation, and expiry reminders. The system keeps real-time records of stock levels, generates bills during transactions, and updates inventory automatically. Moreover, it ensures that patients receive timely SMS notifications with purchase details and voice call alerts before the expiry of medicines. This integration not only improves accuracy and reduces human errors but also enhances customer satisfaction and trust in healthcare services.

By implementing such a system, hospitals and pharmacies can achieve better resource management, reduce losses due to expired medicines, and strengthen their relationship with patients through proactive communication. Ultimately, this contributes to a smarter healthcare environment where technology supports efficiency, transparency, and patient safety.

Literature Review

Pharmacy management systems have been widely studied as an essential part of healthcare. Early systems mainly focused on digitizing manual work such as billing and stock entry, which reduced paperwork but did not address real-time monitoring or patient communication. Kumar and Sharma (2022) discussed the role of digital records in improving accuracy, yet expiry management remained largely manual. Singh and Gupta (2022) noted that many pharmacies still fail to track expiry dates effectively, resulting in wastage and possible health risks.

Later research shifted towards automation and cloud solutions. Lee and Choi (2023) proposed cloud-based pharmacy management for better accessibility, but their system lacked direct patient interaction. Verma and Joshi (2022) highlighted the usefulness of automated notifications for medication reminders, though their work did not integrate expiry alerts or stock updates. Commercial software solutions are available, but they are often expensive, complex, and limited to billing and accounting functions.

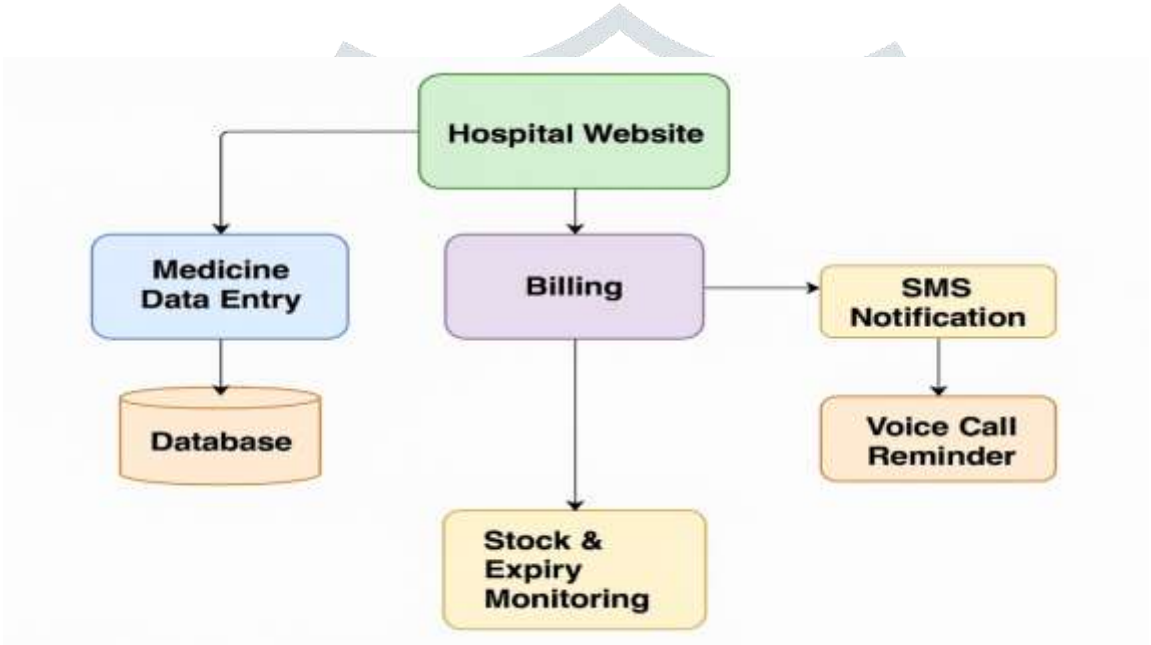
Most existing systems fail to provide a complete solution that combines stock management, billing, expiry tracking, and patient notifications. Very few integrate both SMS and voice call alerts, which are highly effective in reaching patients across diverse regions. There is also limited focus on real-time dashboards and analytics to support pharmacist decision-making.

From this review, it is clear that while progress has been made, there is still a significant gap in providing a cost-effective, automated, and patient-focused pharmacy management system. The proposed system aims to bridge this gap by integrating inventory control, billing, expiry alerts, and patient notifications using web technologies and communication APIs.

Smart HealthCare Pharmacy Management System

Major Functionalities

- Inventory Management
- Billing System
- Customer Notification
- Expiry Alert System
- Dashboard & Reporting



Project Summary

The project **"Smart Healthcare for Hospital Pharmacy Management with Automated Expiry Notification"** is a web-based application designed to enhance the efficiency of pharmacy operations and improve patient safety. The system focuses on automating inventory management, billing, and patient communication through modern technologies.

The **inventory management module** maintains complete records of medicines, including stock levels, sales history, and expiry dates, while generating alerts for low stock and near-expiry medicines. The **billing module** automates the process of generating bills, updates stock quantities in real time, and stores transaction history for future reference. To improve customer engagement, the system provides **automated SMS notifications** containing purchase details and expiry dates, while an **automated voice call feature** reminds customers one week before their medicines expire.

Additionally, the system includes an **interactive dashboard** for pharmacists and administrators, offering insights into stock reports, expiry alerts, sales analytics, and notification logs. Built using **HTML, CSS, JavaScript, Python (Flask), and MySQL**, and integrated with **Fast2SMS and Twilio APIs**, the application ensures reliability, scalability, and ease of deployment on cloud platforms such as AWS or Heroku.

By automating expiry alerts, reducing manual errors, and improving stock control, this project provides a **cost-effective and patient-focused solution** for hospital pharmacies. It not only minimizes wastage of medicines but also promotes better healthcare practices through timely communication with patients.

System Workflow and Technical Implementation

The proposed system is a web-based application developed using Python Flask, MySQL, and Twilio API for automated notifications. The architecture follows a three-tier model consisting of the frontend interface, Flask backend (application logic), and MySQL database.

1. Database Integration (Flask–MySQL Communication)

Flask acts as the middleware between the user interface and the database.
When a pharmacist performs an operation such as adding a medicine, updating stock, or generating a bill, Flask receives the request via an API endpoint (HTTP POST/GET).

Flask connects to MySQL using a connector like mysql connector-python.
SQL queries are executed to insert or update data in tables like sales, sales items, and batches.
After the transaction is committed, Flask returns a success response to the frontend.

2. Billing Process and Real-Time SMS Notification

When a customer purchases a medicine, the pharmacist enters the details on the billing page (billing.html).
Once the "Generate Bill" button is clicked:

The frontend sends a JSON request to the Flask endpoint /api/sales.
Flask validates the request and creates a new entry in sales and sale items.
The stock quantity of each batch is updated using:
After a successful database commit, Flask immediately triggers the Twilio SMS API.

3. Automated Expiry Detection and Notification

A scheduler runs automatically every 24 hours to detect medicines nearing expiry.
The result identifies medicines expiring within the next seven days.
Flask fetches customers who have purchased those medicines.
For each customer, Flask calls the Twilio SMS API and optionally the voice call API to alert them.

4. Voice Call Notification Flow

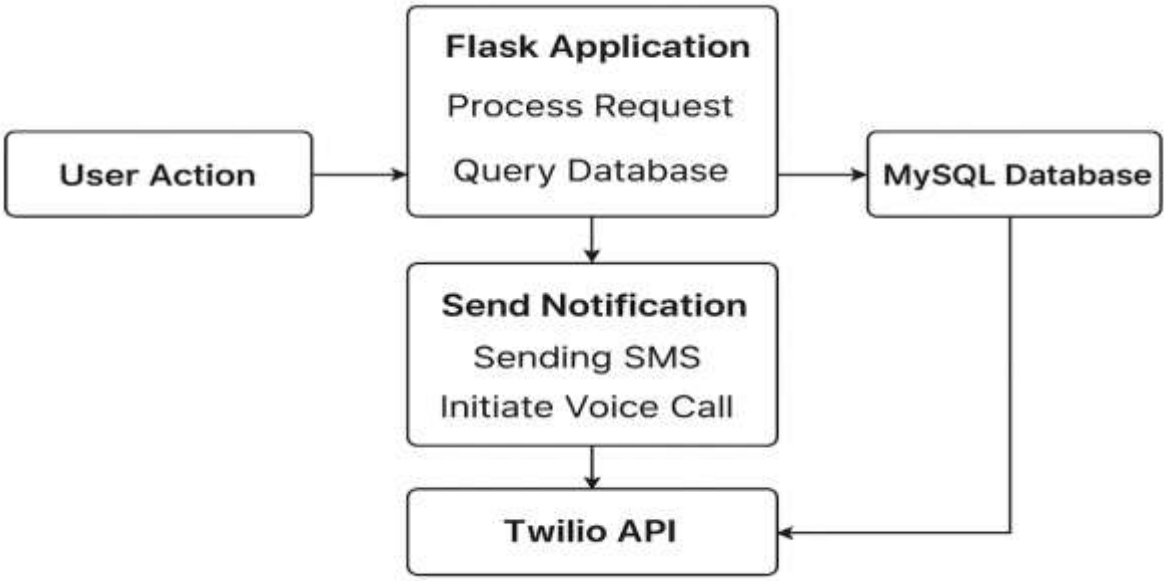
For urgent expiry alerts, the system automatically initiates a Twilio voice call.

Flask prepares a TwiML (Twilio Markup Language) XML response containing the voice message text.
Flask provides the TwiML URL to Twilio using:

```
call = client.calls.create(
   url=https://yourapp.com/voice-alert/123
   to='+91XXXXXXXXXX',
   from_='+1415XXXXXXX'
)
```

Twilio connects the call to the customer and plays the message automatically.

The notification status (sent/failed) is logged in the notifications log table.



5. Data Logging and Tracking

Every SMS or voice call made through twilio is recorded in the notifications log table with details like:

Customer number
Message content
Notification type (Expiry SMS, Billing SMS, Expiry call)
Status (pending, sent, failed)
Timestamp

This allows the system administrator to track communication performance and re-send failed alerts if needed.

CONCLUSION AND DISCUSSION

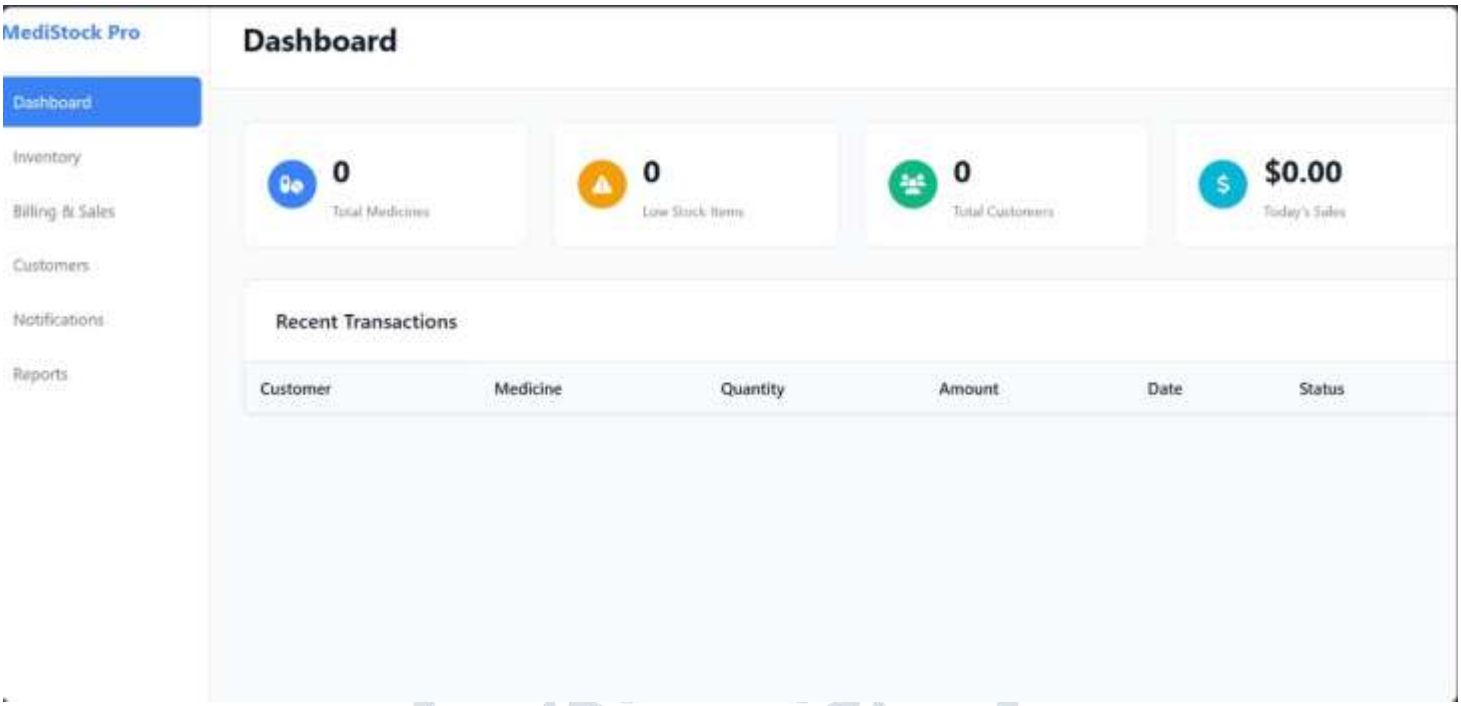
The *Smart Healthcare for Hospital Pharmacy Management with Automated Expiry Notification* system provides an efficient solution for managing hospital pharmacies. It automates inventory tracking, billing, and expiry notifications, reducing errors and medicine wastage. Customers receive timely SMS and voice call alerts about expiry dates, improving safety and adherence.

Pharmacists benefit from real-time stock updates, accurate billing, and a dashboard for monitoring sales and expiry alerts. The system is built using Python, Flask, MySQL, and integrates Fast2SMS and Twilio for notifications, making it reliable and scalable.

Although it depends on internet connectivity and third-party APIs, the system significantly improves pharmacy management and patient communication. Future enhancements like automatic reordering, AI-based demand prediction, and mobile integration can make it even more effective. Overall, the project strengthens healthcare services, saves time, and ensures better patient safety.

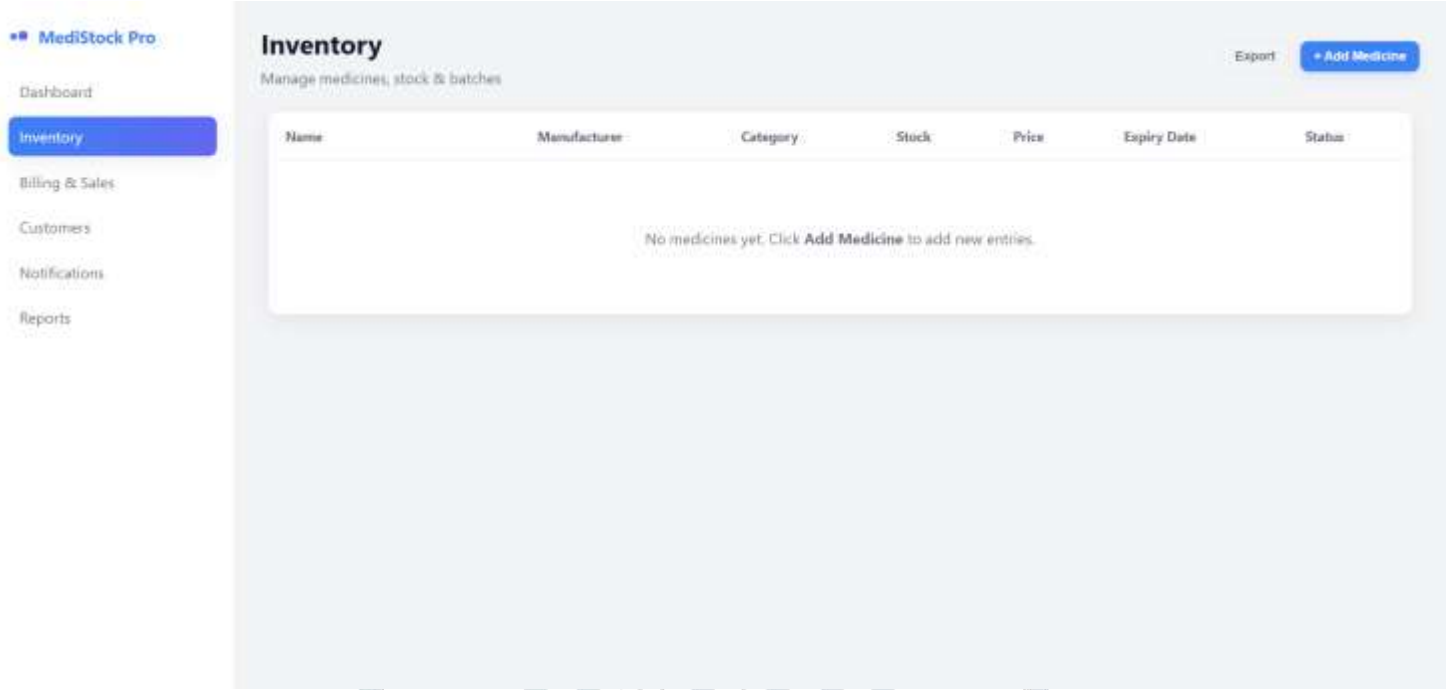
SCREENSHOTS

1. HOME PAGE



2. CALLING PAGE

3. INVENTORY PAGE



REFERENCES

- A. Kumar and P. Sharma, "Pharmacy Management Systems: A Review," *International Journal of Healthcare Technology*, vol. 8, no. 2, pp. 45–52, 2022.
- M. Singh and R. Gupta, "Automated Expiry Notification Systems in Hospital Pharmacies," *Journal of Medical Systems*, vol. 46, no. 5, pp. 112–120, 2022.
- Twilio Inc., "Programmable Voice API Documentation," [Online]. Available: https://www.twilio.com/docs/voice. [Accessed: 25-Sep-2025].
- Fast2SMS, "SMS API Integration Guide," [Online]. Available: https://www.fast2sms.com. [Accessed: 25-Sep-2025].
- P. Ramesh, *Web-based Hospital Management Systems*, 1st ed., New Delhi: Tech Publications, 2021.
- H. Lee and K. Choi, "Cloud-Based Pharmacy Management for Improved Healthcare Services," *International Journal of Cloud Computing*, vol. 10, no. 3, pp. 210–220, 2023.
- S. Verma and A. Joshi, "Role of Automated Notification Systems in Patient Care," *Healthcare Informatics Research*, vol. 28, no. 4, pp. 345–353, 2022.