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DRUG INVENTORY AND SUPPLY CHAIN TRACKING *SYSTEM*

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ABSTRACT-*The Drug Inventory and Supply Chain Tracking System is a software solution designed to improve the management, monitoring, and distribution of pharmaceutical products across the supply chain. The system helps pharmacies, hospitals, and medical shortages, and minimize wasteage caused by expired or overstocked drugs. It provides real-time tracking of medicines from suppliers to warehouses and finally to end users, ensuring complete transparency through the distribution process. The proposed system automates essential operations such as stock management, medicine addition and removal, batch and expiry date monitoring, supplier management, order processing, and inventory reporting. It also generates alerts for low stock levels and approaching expiry dates, enabling timely restocking and reducing financial losses.*

KEYWORDS- *Drug Inventory Management, Supply Chain Tracking, Stock Management, Medicine Tracking, Expiry Date Monitoring, Inventory Automation, Healthcare Supply Chain, Real-Time Inventory.*

INTRODUCTION

The Drug Inventory and Supply Chain Tracking System is designed to improve the efficiency and accuracy of managing pharmaceutical inventories and monitoring the movement of medicines throughout the supply chain. In healthcare organizations such as hospitals, pharmacies, and medical stores, maintaining and adequate stock of medicines is essential to ensure uninterrupted patient care. Traditional inventory management methods often rely on manual record-keeping, which can lead to errors, stock short pages, overstocking, expired medicines, and delays in distribution.

RELATED WORK

Several researchers have proposed inventory management and supply chain tracking systems to improve the efficiency of pharmaceutical operations. Traditional drug inventory systems mainly focused on maintaining stock records and generating reports, but they lacked real-time tracking and automated monitoring features. As a result., healthcare organizations often experienced issues such as medicine shortages, overstocking, expired drugs, and manual data entry errors. Recent studies have introduced digital inventory management systems that automate stock updates, supplier management, and order processing. These systems provide better inventory control by maintaining accurate records of medicine quantities, batch numbers, and expiry dates. Some research has also incorporated barcode and QR code technologies to improve medicine identification and tracking throughout the supply chain, reducing human errors and increasing operational efficiency.

LITERATURE SURVEY

The Drug Inventory and Supply Chain Tracking System has become an important solution for improving the management and distribution of pharmaceutical products. Traditional inventory systems relied on manual record-keeping, which often resulted in stock shortages, overstocking, expired medicines, and human errors. To address these challenges, researchers developed computerized inventory management systems that enable real-time stock monitoring, automated inventory updates, and efficient medicine tracking. Recent studies have incorporated technologies such as barcode and QR code scanning, cloud computing, Artificial Intelligence (AI), predictive analytics, and blockchain to enhance the accuracy, transparency, and security of pharmaceutical supply chains. These technologies help forecast medicine demand, optimize inventory levels, reduce wastage, prevent counterfeit drugs, and improve traceability from manufacturers to end users. Despite these advancements, many existing systems focus only on inventory management or supply chain tracking separately, lacking a fully integrated platform.

EXISTING METHOD

The system helps hospitals and pharmacies maintain medicine stock records, track the movement of medicines from manufacturers to distributors and retailers, and improve transparency throughout the supply chain. It provides features such as inventory monitoring, stock management, report generation, and secure storage of transaction records using blockchain

technology. The system reduces manual errors, improves traceability, and helps identify counterfeit medicines. However, the existing system has several limitations. The implementation cost is high because blockchain technology requires specialized infrastructure and maintenance. The system also depends on a stable internet connection for cloud services, making it less suitable for rural or low-resource healthcare centers. In addition, it does not provide intelligent demand forecasting, automatic stock replenishment, advanced expiry prediction, or user-friendly features for small pharmacies and medical stores. To overcome these limitations, the proposed Drug Inventory and Supply Chain Tracking System provides a simple, affordable, and efficient solution. The proposed system uses QR code-based tracking instead of expensive blockchain or RFID technologies, making it more cost-effective and easier to implement.

PROPOSED METHOD

The proposed Drug Inventory and Supply Chain Tracking System is designed to automate the management of pharmaceutical inventory and monitor the movement of medicines throughout the supply chain. The system maintains a centralized database that stores information such as medicine names, batch numbers, quantities, expiry dates, supplier details, and stock availability. Authorized users can securely add, update, search, and manage inventory records through a user-friendly interface. The system continuously tracks stock levels and automatically generates alerts when medicines are running low or nearing their expiry dates. It also records the movement of drugs from suppliers to warehouses, pharmacies, and hospitals, ensuring complete transparency and traceability throughout the supply chain. Order management and supplier information are integrated into the system to simplify procurement and reduce delays in medicine distribution.

SYSTEM ARCHITECTURE

The system architecture consists of an Administrator, a Flask-based Web Applications, different management modules, and a MYSQL database. The Administrator logs into the the web application and manages all system activities. The flask web application acts as the central controller, processing user requests and communicating with the database. The system is divided into five main modules, Medicine management, Supplier Management, Inventory Management, Purchase Management, Reports. All modules are connected to the MYSQL Database, where the system securely stores and retrieves data.

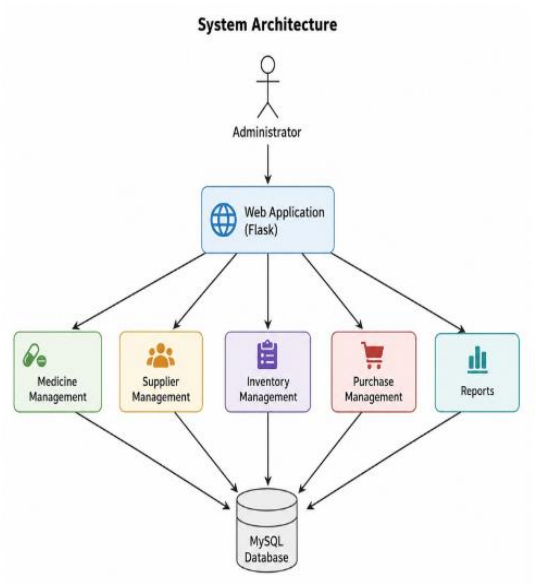

Fig 1: System Architecture

METHODOLOGY DESCRIPTION

The proposed Drug Inventory and Supply Chain Tracking System follows a modular architecture developed using Flask as the web framework and MYSQL as the database. Each module performs a specific function to ensure efficient medicine inventory and supply chain Management. The administrator logs into the system and manages medicines, suppliers, inventory, purchases, and reports. This modules stores medicine details such as medicine name, batch number, category, expiry date, price and stock quanties. This module manages supplier information, including supplier name, contact details, address, and supplied medicines. This module monitors stock levels, updates inventory after updates or sales, and identifies low-stock and expired medicines for timely replenishment.

RESULTS AND DISCUSSION

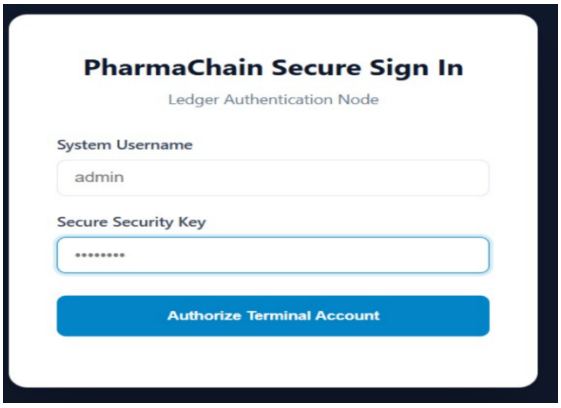

Fig 2: Admin Login Page

The login page allows the administrator to securely access the Drug Inventory and Supply Chain Tracking System using a valid username and password.

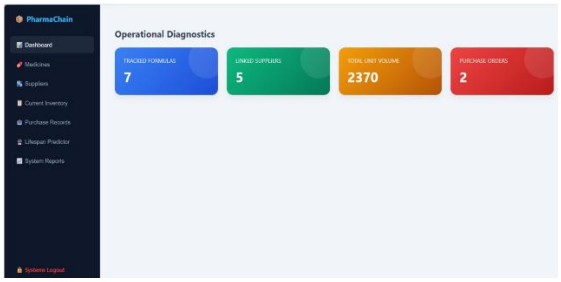

Fig 3: Operational Diagnostics Dashboard

The operational Diagnostics Dashboard provides a centralized view of the drug inventory and supply chain by displaying medicine details, supplier information, current inventory, purchase records, total stock volume, purchase orders, expiry prediction, system reports, and overall inventory status for efficient monitoring and management.

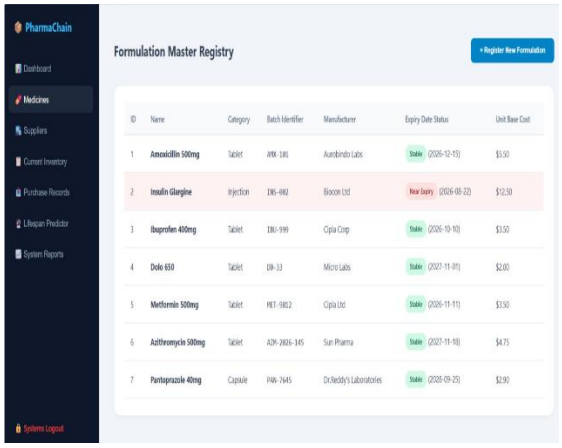

Fig 4: Formulation Master Registry

This page displays the registered medicine formulations along with their category, batch ID, manufacturer, expiry status, and unit cost for easy inventory management.

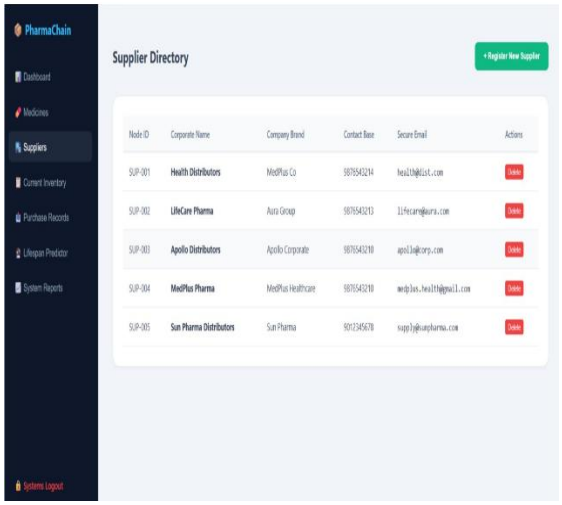

Fig 5: Supplier Directory

The Supplier Directory page displays the list of all registered medicine suppliers in the Drug Inventory and Supply Chain Tracking System. It includes Supplier details such as Supplier ID, Company Name, Brand, Contact Number, and Email Address.

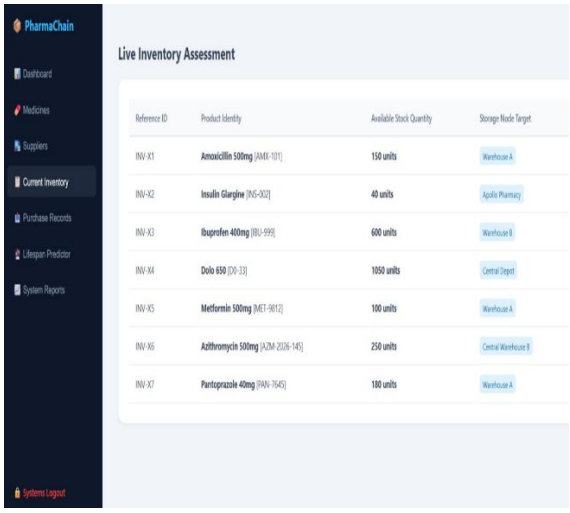

Fig 6: Live Inventory Assessment

Shows the current stock status of medicines with their reference ID, product name, available quantity, and assigned storage warehouse.

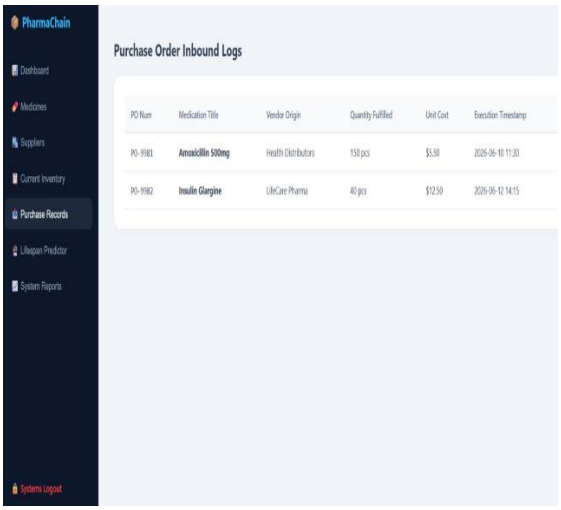

Fig 7: Purchase Order Inbound Logs

The Purchase Order Inbound Logs page records all received purchase orders, including medicine details, supplier, quantity received, unit cost, and delivery timestamp for inventory tracking.

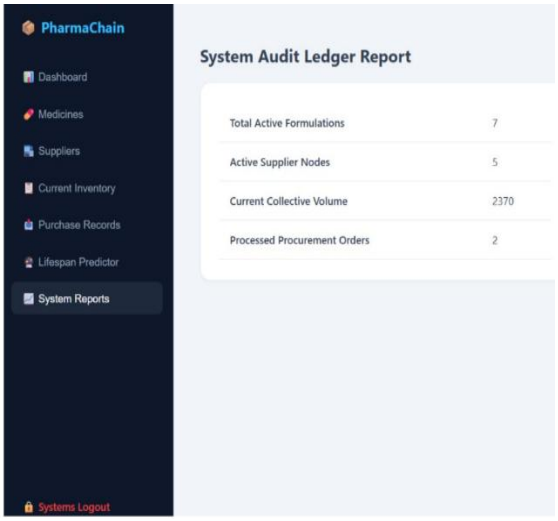

Fig 8: System Audit Ledger Report

The System Audit Ledger Report provides a summary of active formulations, supplier nodes, inventory volume, and processed procurement orders for monitoring and auditing the drug inventory and supply chain system.

CONCLUSION

The Drug Inventory and Supply Chain Tracking System provides an efficient and reliable solution for managing pharmaceutical inventory and monitoring the movement of medicines throughout the supply chain. By automating stock management, supplier tracking, expiry monitoring, and report generation, the system reduces manual effort, minimizes human errors, and improves inventory accuracy. It ensures the timely availability of medicines, prevents stock shortages and wastage due to expired products, and enhances transparency across the supply chain.

FUTURE SCOPE

The Drug Inventory and Supply Chain Tracking System can be further enhanced by integrating advanced technologies such as Artificial Intelligence (AI) for demand forecasting and automated inventory optimization. Future versions may include IoT-enabled smart sensors for real-time monitoring of medicine storage conditions, blockchain technology for secure and transparent drug traceability, and mobile applications for remote inventory management. Additional features such as automated purchase order generation, supplier performance analysis, and predictive analytics can further strengthen inventory control and ensure the continuous availability of medicines.

REFERENCES

[1] P. Harini, “Sms based wireless e-notice board,” *International Journal of Emerging Technology and Advanced Engineering,* vol. 3, no. 3, pp. 181-185, 2013.

[2] P. Harini, “Enhanced packet delivery techniques using crypto-logic riddle on jamming attacks for wireless communication medium,” *Int. J. Latest Trends Eng. Technol,* vol. 2, no. 4, pp. 469-478, 2013.

[3] P. Harini, "[Retracted] Machine Learning Algorithms Are Applied in Nanomaterial Properties for Nanosecurity," *Journal of Nanomaterials,* vol. 2022, no. 1, p. 5450826, 2022.

[4] World Health Organization (WHO), Medicine Supply Management. **Link:** https://www.who.int

[5] U.S. Food and Drug Administration (FDA), Drug Supply Chain Security Act (DSCSA).
Link: https://www.fda.gov/drugs/drug-supply-chain-security-act-dscsa

[6] World Health Organization (WHO), *Guidelines for Medicine Supply Management*.
Link: https://www.who.int

[7] U.S. Food and Drug Administration (FDA), *Drug Supply Chain Security Act (DSCSA)*.
Link: https://www.fda.gov

[8] IBM Corporation, *Blockchain for Supply Chain Solutions*.
Link: https://www.ibm.com/blockchain

[9] Amazon Web Services (AWS), *Cloud Computing in Healthcare*.
Link: https://aws.amazon.com/health

[10] Microsoft Azure, *Healthcare Cloud Solutions*.
Link: https://azure.microsoft.com

[11] Oracle Corporation, *Inventory Management Cloud*.
Link: https://www.oracle.com

[12] SAP SE, *SAP Integrated Business Planning for Supply Chain*.
Link: https://www.sap.com

[13] M. T. Frohlich and R. Westbrook, "Arcs of Integration: An International Study of Supply Chain Strategies," *Journal of Operations Management*, vol. 19, no. 2, pp. 185–200, 2001.

[14] F. Tao, Q. Qi, A. Liu, and A. Kusiak, "Data-Driven Smart Manufacturing," *Journal of Manufacturing Systems*, vol. 48, pp. 157–169, 2018.

[15] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, 2008.
Link: https://bitcoin.org/bitcoin.pdf

[16] GS1, *Healthcare Supply Chain Standards*.
Link:
https://www.gs1.org/industries/healthcare

[17] World Health Organization (WHO), *Medical Products and Health Technologies*.
Link: https://www.who.int/teams/health-product-policy-and-standards

[18] Centers for Disease Control and Prevention (CDC), *Medication Safety Program*.
Link: https://www.cdc.gov/medication-safety/

[19] National Institute of Standards and Technology (NIST), *Cybersecurity Framework*.

Link:

https://www.nist.gov/cyberframework

[20] Oracle, *Supply Chain Management Solutions*.

Link: https://www.oracle.com/scm/