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Skip The Line:A Queue Free Medicine Dispensing For In-House Pharmacies

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ABSTRACT

Skip the Line is a web-based standalone application designed to modernize the medicine dispensing process in hospitals by eliminating the need for physical queues. It enables seamless interaction between patients, pharmacy staff, and administrators through an intuitive interface. Patients can register, log in, and upload prescriptions as in-patients or out-patients. Each prescription receives a unique tracking ID, allowing users to monitor their request status in real-time. The system also integrates online payment functionality via Razor pay, ensuring a smooth and secure checkout experience.

Built using Python Flask for the back end and MySQL for database management, the application also features email notifications using SMTP and PDF bill generation via the ReportLab library. An admin dashboard allows hospital staff to manage prescriptions, update inventory, track user logins, change statuses, and generate bills. Additionally, a built-in chat bot enhances user experience by addressing frequently asked questions related to medicines, uploads, payments, and system usage. Overall, the platform aims to reduce patient waiting times, enhance operational efficiency, and provide a secure, contact less pharmacy experience. This solution aims to improve patient satisfaction by optimizing the pharmacy workflow and reducing wait times, ultimately enhancing the overall hospital experience

INTRODUCTION

In today's fast-paced healthcare environment, hospitals strive to deliver efficient, patient-centric services. While diagnosis and treatment are primary, support services like in-house pharmacies significantly impact the overall patient experience. Long queues, manual prescription handling, and lack of communication often lead to delays and frustration, especially during peak hours. Inpatients may miss timely doses, while outpatients face extended wait times, contributing to inefficiencies in hospital workflows.

Most hospital pharmacies still rely on manual workflows—physical submission of prescriptions, verification, billing, and dispensing—without real-time tracking or patient prioritization. This system lacks integration with hospital databases, fails to distinguish between admitted and discharged patients, and often leaves patients unaware of their order status. The absence of digital tools results in delays, medication errors, and overburdened staff, highlighting a clear need for modernization.

Skip the Line is a standalone web application designed to automate and streamline the medicine dispensing process. Patients can upload prescriptions online, track status using a unique ID, and make secure payments via Razorpay. The system distinguishes between admitted and discharged patients to enable faster, context-aware delivery. With features like real-time status tracking, chat bot support, and QR code-based access, the platform reduces waiting time, improves communication, and brings convenience and efficiency to hospital pharmacy operations.

LITERATURE SURVEY

The efficient management of hospital pharmacies is crucial to ensuring timely access to medications for both in-patients and out-patients. With rising patient volumes and increasing expectations for fast, accurate service, healthcare institutions are exploring

innovative solutions to streamline the medicine dispensing process. This section reviews existing research on technologies and systems implemented to enhance pharmacy operations, patient satisfaction, and service delivery. The studies examined cover aspects such as automation, queuing theory, digital prescription systems, and cost-efficiency measures within healthcare service operations. This research paper looks at ways to make getting medicine at hospital pharmacies faster and easier for patients. It reviews different technologies and systems that have been studied:

Service in pharmacy department in a hospital is provided under the direction of a professionally competent, legally qualified pharmacist, and from this department all medications are supplied to the nursing units and other services, where special prescriptions are filled for patients in the hospital, for ambulatory patients and out-patients as well [1], Customer satisfaction and service operation capabilities have given an organization a competitive advantage in the marketplace and this has consequently led to an increasing importance in service operations management [4], the healthcare industry has never been business oriented. It has been accustomed to spending with limited budgetary oversight, seeking to preserve or enhance perceived quality. Unfortunately, core issues relating cost and quality have not been adequately addressed, and the cost of healthcare has again begun increasing in the past few years[16], A high level of service will cost more to provide and will result in lower dissatisfaction costs. When considering improvements in services, the health care manager weighs the cost of providing a given level of service against the potential costs from having patients waiting [32].

EXISTING SYSTEM

Most hospitals today use semi-automated pharmacy systems or basic Hospital Information Systems (HIS) that include modules for billing, inventory, and patient records. These systems often focus on back-office operations, such as stock management and procurement, while prescription handling and patient interaction remain manual. Patients are required to physically submit prescriptions at the pharmacy counter, wait in queues, and manually inquire about medicine availability and readiness. Examples include platforms like Meditek, Insta by Practo, and eHospital by NIC (National Informatics Centre, India), which provide pharmacy billing and stock management features but lack interactive, real-time communication with patients.

Additionally, these existing systems do not offer features like online prescription uploads, automated status tracking, or patient-specific medicine delivery classification (e.g., admitted vs discharged). There is also minimal integration of user-friendly tools such as chatbots, QR-based access, or secure digital payment gateways. As a result, patients still face long wait times, unclear pickup processes, and delayed medicine delivery. These limitations highlight the need for a more dynamic, interactive, and patient-centered solution—one that "Skip the Line" aims to fulfill by digitizing the entire medicine dispensing workflow from prescription upload to final delivery or pickup.

DRAWBACKS TO EXISTING SYSTEM

Seven major limitations characterize current medicine dispensing system:

1. Manual Prescription Handling: Most existing systems still require patients to submit physical prescriptions at the pharmacy counter, which leads to longer wait times, especially during peak hours.
2. Lack of Real-Time Status Updates: Patients have no visibility into the progress of their medicine request—whether it's being processed, delayed, or ready for pickup—resulting in repeated visits and unnecessary crowding.
3. No Patient Categorization: Current systems do not differentiate between inpatients (who require bedside delivery) and outpatients (who pick up medicines), causing inefficiencies and delays in prioritization.
4. Limited User Interaction: There is minimal support for online uploads, chatbot assistance, or messaging features, making it difficult for patients to communicate with pharmacy staff or get timely information.
5. No Integrated Digital Payments: Many systems lack support for secure, online payment gateways, forcing patients to rely on cash or card transactions at the counter, which adds to delays.
6. Poor Accessibility: Most systems are desktop-based and require patients to be physically present. They do not support QR code access or mobile-friendly interfaces for quick and remote interaction.
7. Fragmented Hospital Integration: Pharmacy operations often function in isolation and are not well-integrated with other hospital systems like Electronic Health Records (EHRs) or discharge management modules.

PROPOSED SYSTEM METHODOLOGY

The proposed system, "Skip the Line," is a web-based application aimed at digitizing and optimizing the hospital pharmacy process. It enables patients to upload prescriptions, track medicine status, and make online payments, reducing wait times and manual workload.

Key Features of the Proposed System:

1. Digital Prescription Management

Doctors will generate and submit prescriptions digitally through the hospital management system (HMS), eliminating the need for physical prescription slips. The system will automatically validate prescriptions, ensuring correct medicine dosage, availability, and compatibility with patient records. The prescription details will be sent instantly to the pharmacy**,** reducing processing time.

2. Automated Medicine Dispensing System

The system will integrate with Automated Dispensing Units (ADUs), which will retrieve and dispense medicines based on the digital prescription. Medicines will be identified using barcode or RFID technology to eliminate errors. The dispensing process will be fully automated, ensuring fast and accurate medicine retrieval.

3.Real-Time Queue-Free Patient Notification

Patients will receive instant notifications via SMS, email, or a mobile app when their medicines are ready. The system will provide estimated wait times and allow patients to track the dispensing status remotely. Patients will be able to authorize caregivers to collect their medicines if needed.

4. Intelligent Queue and Priority Management

The system will prioritize medicine dispensing based on urgency, patient condition, and prescription type (e.g., emergency cases will be served first). Patients will no longer need to wait in long queues, as medicines will be dispensed automatically when ready.

Core functionalities:

1. User Registration & Login
Patients and admins can securely log in. Sessions are managed with hashed passwords for user safety.
2. Prescription Upload & Categorization
Patients upload prescriptions and are classified as admitted (in-room delivery) or outpatients (counter pickup).
3. Real-Time Tracking
A unique tracking ID lets patients monitor their prescription status (Pending → Ready → Active).
4. Admin Dashboard
Admins manage prescriptions, inventory, and billing, and can change statuses or send updates via the dashboard.
5. Inventory & PDF Billing
Prescriptions are matched with inventory, and auto-generated PDF bills are emailed directly to the patient.
6. Online Payments
Patients pay securely through an integrated Razorpay gateway with UPI, card, or net banking support.
7. QR Access & Chatbot Support
Patients can access the app via a QR code and use the chatbot for instant help with queries.

PROPOSED SYSTEM ARCHITECTURE

The architecture is designed with a role-based flow, involving four key users: Patient, Doctor, Pharmacy Administrator, and Admin. Each has specific functionalities to streamline the prescription-to-delivery process.

1. Patient Module
1.1. Signup / Signin / Password Reset: Secure access to the system with authentication.
1.2. Upload Prescription: Patient uploads scanned prescription using OCR support.
1.3. Choose Duration: For how long the medicines are required (important for chronic patients).
1.4. Check Cost: View estimated medicine costs.
1.5. Customize Order: Remove/replace items based on preference.
1.6. Track Order Status: Real-time updates (Pending → Ready → Active).
1.7. Chatbot Interaction: Get instant help for common queries.

2. Pharmacy Administrator Module
2.1. View Prescription Requests: Access uploaded and OCR-processed prescriptions.
2.2 Process Orders: Match with inventory and initiate processing.
2.3. Update Status: Change the order state (Ready, Delivered, etc.).
2.4. Deliver to Room / Prepare for Pickup:
2.5. Admitted Patients: Medicines are delivered to rooms.
2.6. Outpatients: Medicines are packed for pickup at the counter.

3. Admin Module
3.1. CRUD Operations:
Create / Read / Update / Delete system data (users, inventory, logs, roles, etc.).
3.2. Oversee all transactions, system logs, and access control.

4.Supportive Technologies
4.1. Chatbot Integration: For 24x7 patient support.

4.2. Secure Authentication: Role-based access with hashed passwords.
4.3. Database: Stores user data, prescriptions, inventory, transactions.

5. External APIs:
5.1. Razorpay: For UPI, card, and net banking payments.
5.2. Email Service: Sends PDF invoices to patients.
5.3. QR Code Generator: For instant access to app.

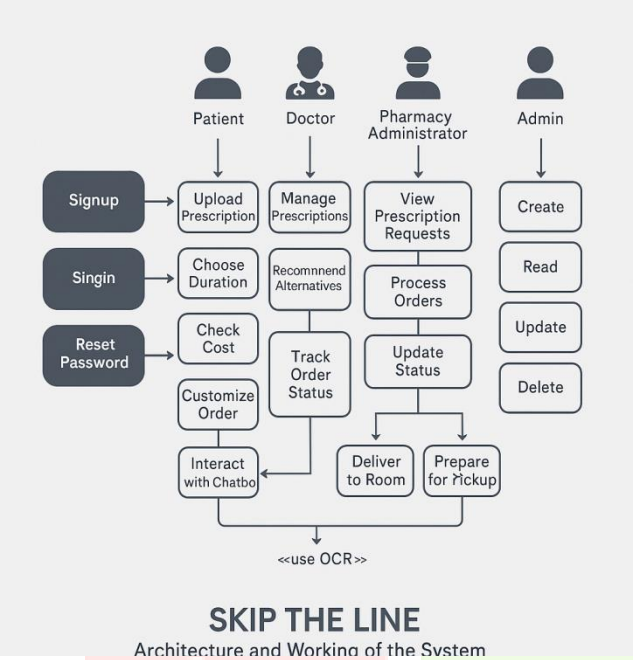

Fig:[1]: System Architecture

BENEFITS OF THE PROPOSED SYSTEM

The proposed system, *"Skip the Line,"* offers numerous benefits aimed at transforming the traditional pharmacy workflow in hospitals. It significantly reduces patient waiting time by allowing online prescription uploads and real-time order tracking. Patients receive timely updates, eliminating the need to stand in queues. Doctors can manage and recommend alternatives to prescriptions digitally, ensuring better treatment continuity. Pharmacists benefit from an efficient inventory matching system that avoids stock outs and automates order processing. The integration of secure online payments via Razorpay adds convenience for patients, while auto-generated PDF bills improve transparency and reduce manual errors. Furthermore, chatbot support ensures 24/7 query resolution, and QR-based access makes the system easily accessible. Role-based login ensures data security, and admitted patients can enjoy in-room delivery, whereas outpatients are notified when their orders are ready for pickup.

1. Reduces patient waiting time through digital prescription uploads and tracking.
2. Enables doctors to manage prescriptions and suggest alternatives online.
3. Streamlines pharmacy workflow with real-time inventory matching.
4. Supports secure online payments via Razorpay (UPI, cards, net banking).
5. Auto-generates PDF bills and sends them directly via email.
6. Chatbot provides instant assistance, reducing manual support workload.
7. Offers in-room delivery for admitted patients and pickup for outpatients.
8. Ensures role-based access for enhanced security (Patient, Doctor, Admin, Pharmacist).
9. Accessible via QR code for convenience and ease of use.
10. Improves overall transparency, accuracy, and efficiency in hospital pharmacies.

RESULTS

The implementation of the *"Skip the Line"* system resulted in a streamlined and efficient hospital pharmacy process. Patients were able to register, upload prescriptions, and track their medicine orders seamlessly through the web application. Real-time updates, along with secure online payments and automated billing via PDF, enhanced the overall user experience. Admins and pharmacy staff efficiently managed inventory and order statuses through the dedicated dashboard, while chatbot support ensured continuous assistance to users. The integration of QR code access and OCR for prescription recognition added to the system's ease of use and accuracy. Overall, the system successfully reduced patient wait times, minimized manual errors, improved operational transparency, and demonstrated the potential for scalable deployment across healthcare institutions.

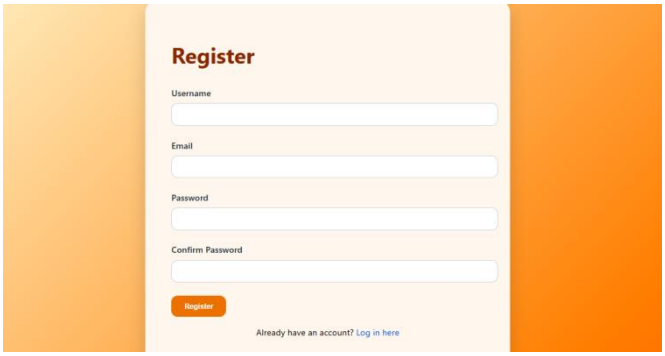

Fig:[2] New user registration

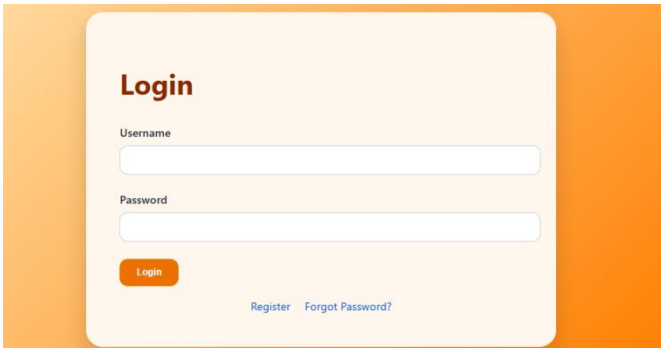

Fig:[3]Login page

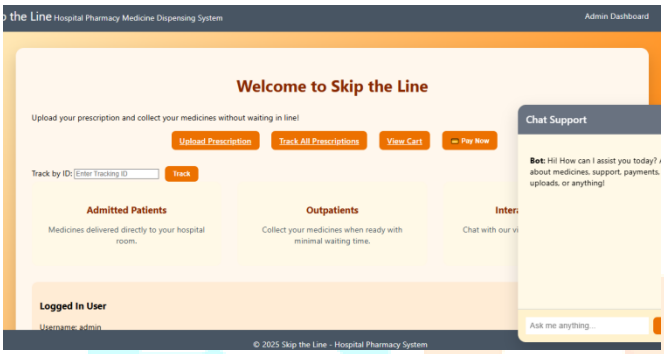

Fig:[4] Home page

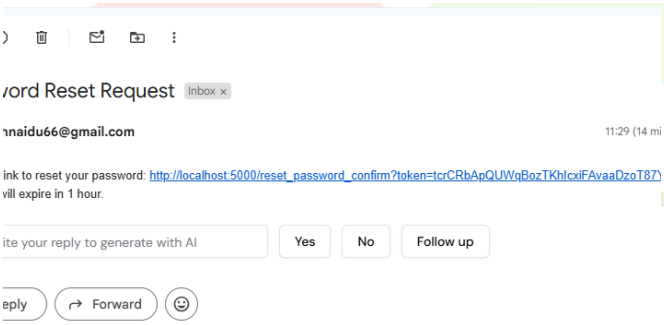

Fig:[5] Password reset link sent to email

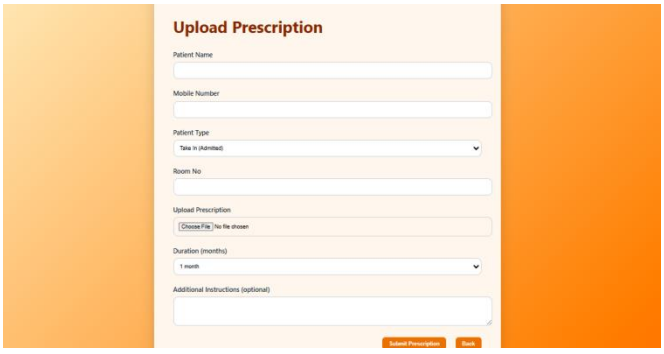

Fig:[6] Upload prescription

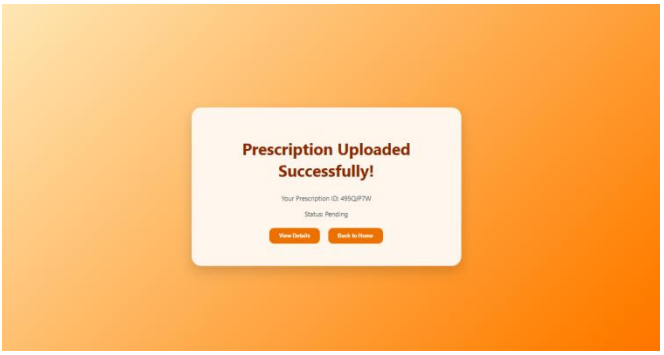

Fig:[7] Prescription uploaded successfully

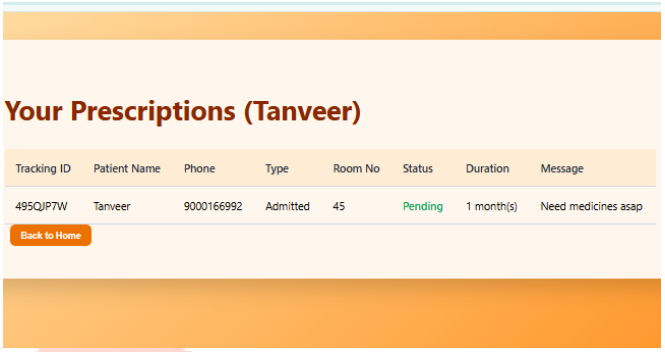

Fig:[8] Track prescriptions

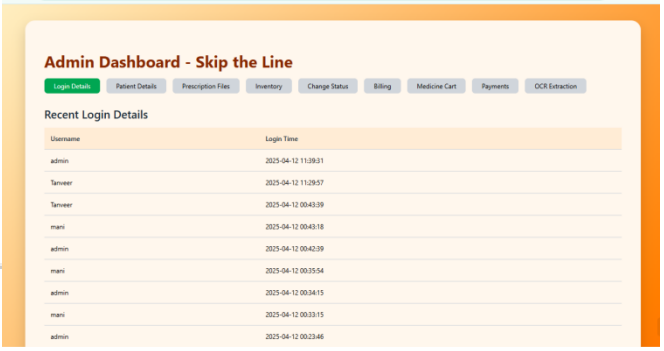

Fig:[9] Admin dashboard (login details)

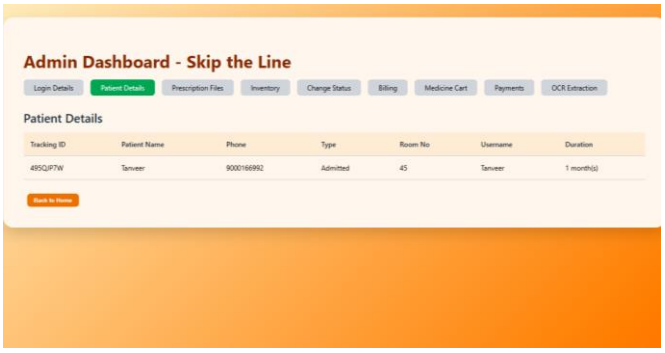

Fig:[10]Patient details

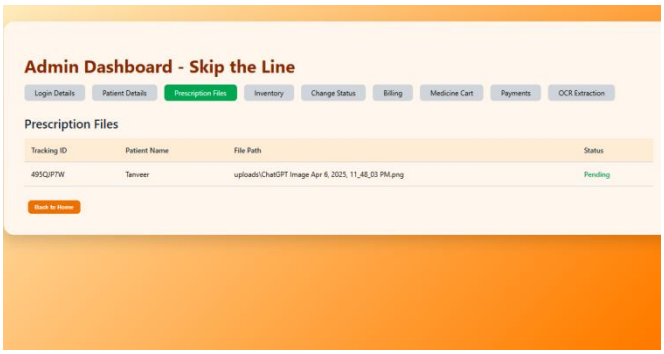

Fig:[11] Prescription files

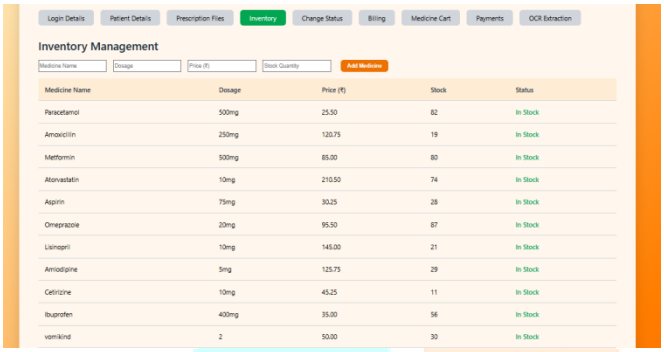

Fig:[12] Medicine Inventory

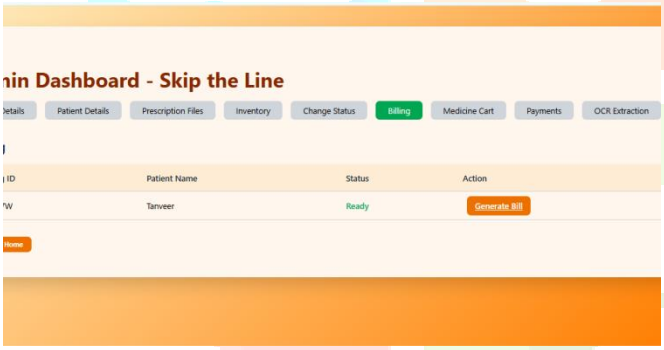

Fig:[13] Billing status admin side

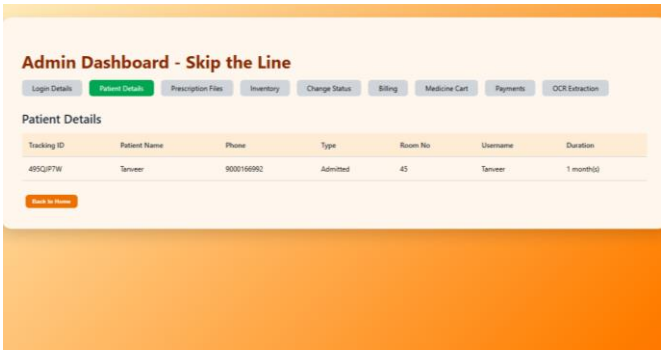

Fig:[14] Payment details

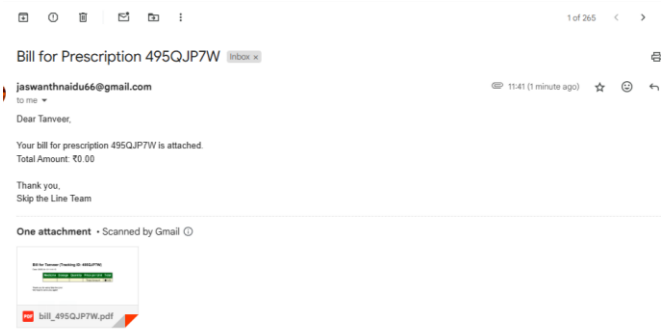

Fig:[15] Pickup ready & bill generation email

CONCLUSION

In conclusion, the *"Skip the Line"* system effectively modernizes and simplifies the hospital pharmacy experience by leveraging digital tools to reduce patient wait times, improve order accuracy, and streamline administrative workflows. With features like real-time tracking, secure payments, chatbot support, and automated billing, the system not only enhances user convenience but also boosts operational efficiency for hospital staff. The successful implementation demonstrates how technology can bridge gaps in healthcare delivery, offering a scalable solution that can be adapted by medical institutions to improve patient satisfaction and overall service quality.

FUTURE SCOPE

The "Skip the Line" system holds great potential for future enhancements and broader adoption across healthcare institutions. Upcoming improvements could include AI-based prescription analysis, multilingual chatbot support, integration with electronic health records (EHR), and real-time inventory syncing with suppliers. Additionally, expanding the platform into a mobile application can further improve accessibility for patients. With proper data analytics integration, hospitals can also monitor medicine demand trends and optimize procurement. As digital health adoption grows, this system can evolve into a comprehensive e-health solution for managing prescriptions, consultations, and patient engagement seamlessly.

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