AI-POWERED HOTEL CHECK-IN AND MANAGEMENT SYSTEM

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Abstract: The AI Hotel Management System is a modern, web-based application designed to streamline and automate hotel operations using artificial intelligence. The system provides a comprehensive suite of features for managing guest bookings, check-ins, room assignments, and identity verification. Leveraging AI-driven workflows, such as automated guest identity verification and data extraction from identification documents, the platform enhances security and reduces manual workload for hotel staff. The intuitive dashboard allows hotel managers to oversee bookings, guests, and room statuses efficiently, while guests benefit from a seamless check-in experience, including digital confirmation and downloadable check-in slips. Built with a modular architecture and a user-friendly interface, the system is scalable and adaptable to various hotel sizes and operational needs. The integration of advanced UI components and AI services positions this solution at the forefront of digital transformation in the hospitality industry

Keywords: TypeScript, NextJS, Firebase, Genkit, RESTful APIs, OCR, Gemini-2.5-Pro, Optical Character Recognition, Hotel Management System

1.INTRODUCTION

The hospitality industry is rapidly evolving, with technology playing a pivotal role in enhancing operational efficiency and guest satisfaction. Traditional hotel management systems often require significant manual intervention, leading to inefficiencies and potential errors. To address these challenges, the AI Hotel Management System leverages artificial intelligence and automation to streamline hotel operations and deliver a superior guest experience. The hospitality industry is increasingly adopting technology to meet the growing demands for efficiency and personalized guest experiences. This project addresses critical challenges such as manual errors, time-consuming check-in processes, and security concerns. By automating these processes, the system not only enhances operational efficiency but also improves customer satisfaction. The integration of AI ensures that the system is scalable and adaptable to future technological advancements, making it a valuable asset for modern hotels aiming to stay competitive in a tech-driven market. The primary target audience for this system includes hotel managers, staff, and guests. Hotel managers can benefit from the system's ability to provide real-time insights into bookings, revenue, and guest statuses. Staff members can use the platform to streamline their daily operations, reducing workload and improving service quality.

2. LITERATURE SURVEY

1. Gupta and Singh [1] demonstrate that AI-driven hotel check-in solutions can significantly reduce wait times and manual intervention, streamlining the process for both guests and staff.
2. Kumar and Patel [2] examine the use of Optical Character Recognition (OCR) technologies for Aadhaar ID verification in hospitality, emphasizing improvements in accuracy and speed.
3. Zhang and Chen [3] highlight the effectiveness of self-check-in solutions using facial recognition, which not only improve customer experience but also enhance security
4. Lee and Kim [4] find that AI-enabled systems can substantially reduce physical queues and administrative burdens, leading to more efficient hotel operations.
5. Wang and Liu [5] detail the integration of biometric and OCR techniques, showing how these methods provide seamless and secure identity verification during check-in.
6. Patel et al. (2020) [7] analyze the use of predictive analytics in hotel management, demonstrating that AI algorithms can forecast occupancy rates and optimize pricing strategies, resulting in increased revenue and better resource allocation.
7. Kumar and Sharma (2022) review the adoption of AI-based security systems in hotels, highlighting the effectiveness of facial recognition and surveillance analytics in enhancing guest safety and preventing unauthorized access.
8. The literature survey highlights the potential of AI, OCR, and biometric authentication techniques in modernizing hotel management systems, improving operational efficiency, and providing a more secure and convenient experience for guests

3. PROPOSED SYSTEM

The proposed system, SwiftCheck, is an advanced AI-powered hotel management platform designed to address the limitations of traditional systems. It leverages artificial intelligence and modern web technologies to automate and streamline key hotel operations, including guest registration, room allocation, and check-in/check-out processes. The system incorporates AI-driven identity verification using OCR (Optical Character Recognition) to extract and validate guest details from ID images, significantly reducing manual errors and fraud. SwiftCheck provides a user-friendly interface for both guests and hotel staff, enabling real-time updates, automated notifications, and seamless communication.

1. **Authentication Module :**
   The Authentication Module serves as the secure gateway for the AI-powered hotel management system, controlling access to specific functionalities based on user roles. This module implements a comprehensive user identity management system with role-based access control, distinguishing between hotel staff and guests to deliver customized experiences.
2. **Booking Management Module:**
   The Booking Management Module forms the core operational system for managing room reservations throughout their lifecycle. It provides comprehensive functionality for creating, viewing, modifying, and canceling bookings while maintaining a consistent database of all reservation records.
3. **Guest Management Module:**
   The Guest Management Module provides hotel staff with tools to efficiently manage aspects of guest information and service delivery. It maintains comprehensive guest profiles that include personal information, contact details, booking history, and special preferences or requirements.
4. **Room Management Module :**
   The Room Management Module handles all aspects of room inventory, availability tracking, and allocation within the hotel system. It maintains a comprehensive database of all room types with detailed information including room names, descriptions, maximum capacity, amenities, and pricing structures.
5. **AI Face Verification Module:**
   The AI Face Verification Module provides a sophisticated biometric authentication system that enables secure and convenient self-check-in for hotel guests. This module leverages computer vision and facial recognition algorithms to verify guest identities by comparing their live selfie with their ID document photo
6. **Dashboard Module:**
   The Dashboard Module provides customized administrative interfaces tailored to different user roles within the hotel management system. It serves as the central command center from which users can access and manage functionality appropriate to their position and responsibilities.

Technologies Used:

- **Backend:** Node JS, Firebase Runtime.
- **Frontend:** Tailwind CSS, TypeScript, ReactJS, NextJS.
- **Database:** Firebase NOSQL Database.
- **APIs:** RESTful services for modularity and integration, Google Gemini API for OCR.
- **Deployment:** Can be hosted on a local server or cloud (e.g., AWS, Heroku)

System Advantages:

- Scalable microservice architecture using RESTful API,.
- Clean, user-friendly interface with responsive design powered by React & Tailwind.
- Efficient, Synchronous Onboarding Experience.
- Secure login and role management for different user types.
- Gemini 2.5 Pro for accurate OCR and Information Scrap.

Advantages of the Proposed System

- **Automation of Key Operations**: SwiftCheck automates guest registration, room allocation, and check-in/check-out, increasing efficiency and reducing errors.
- **AI-Driven Identity Verification:** Uses AI and OCR for quick and secure guest ID validation, reducing fraud and manual errors.
- **User-Friendly Interface:** Offers an intuitive interface for guests and staff, enhancing user experience and satisfaction.
- **Real-Time Updates and Notifications:** Provides real-time updates and automated notifications for better communication and coordination.
- **Enhanced Security:** AI-powered identity verification enhances security, preventing fraudulent activities.
- **Seamless Communication:** Facilitates smooth communication between guests and staff, improving service quality and issue resolution.

2.OUTPUT SCREENS

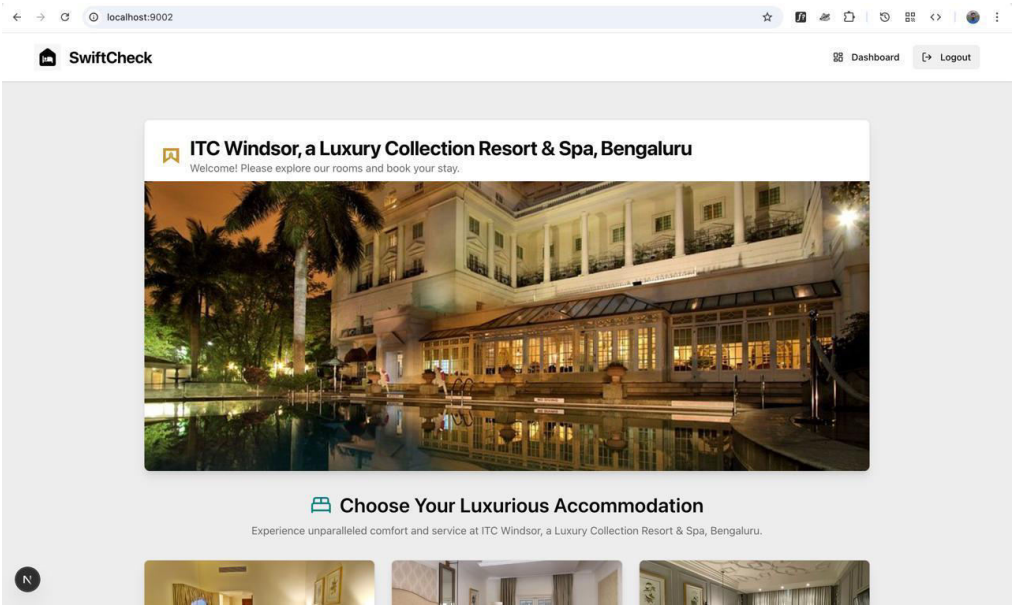

Fig. 4.1. Landing Page

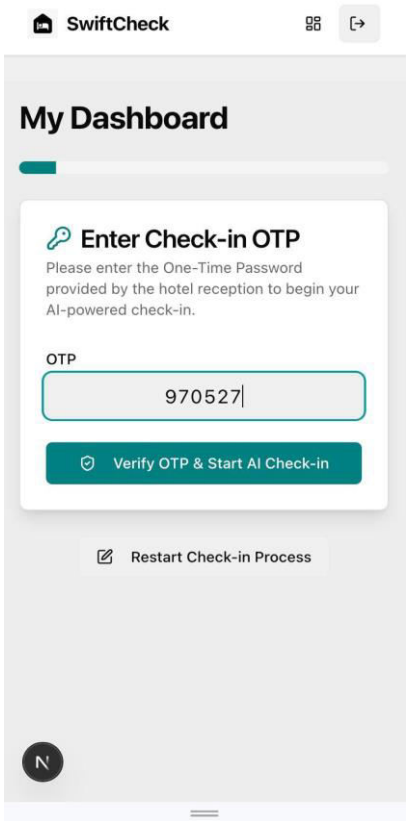

Fig. 4.1. OTP Check-in

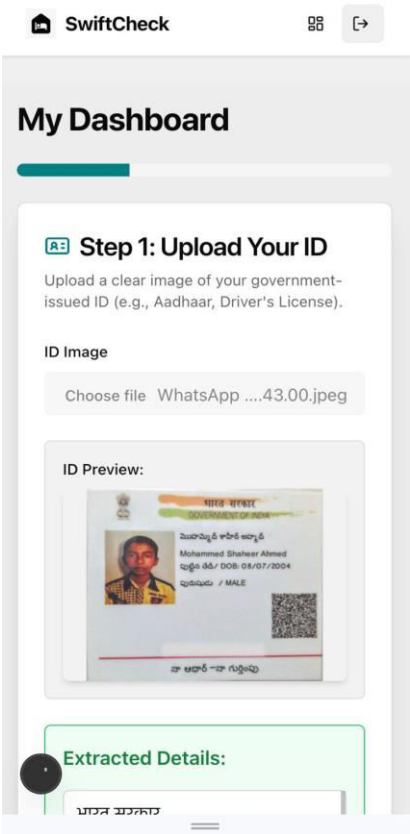

Fig. 4.2. ID Upload Screen

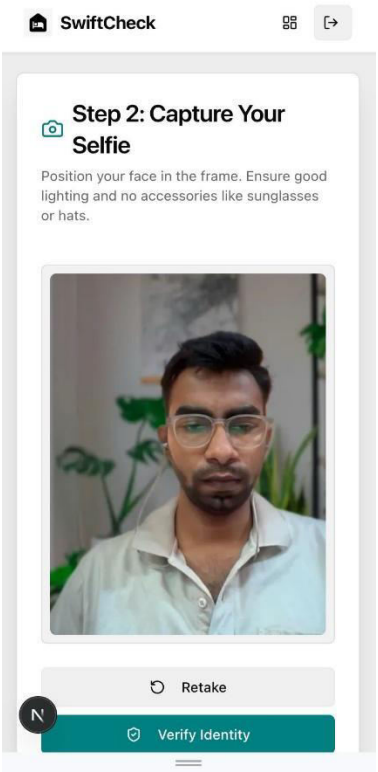

Fig. 4.3. Selfie Verification

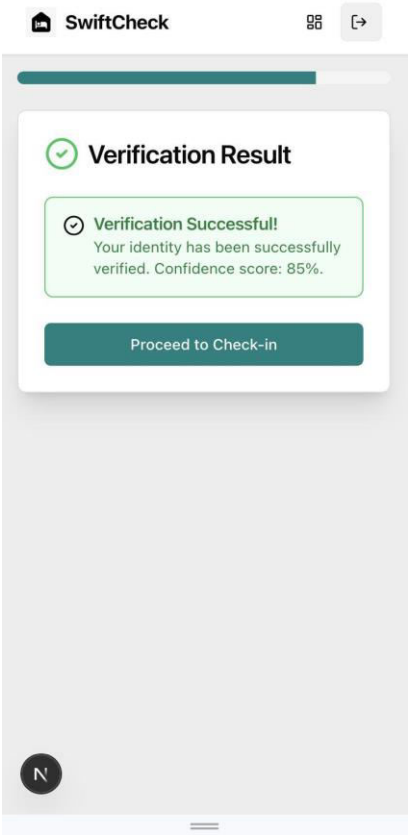

Fig. 4.4. Verification Result

5. CONCLUSION

This AI-powered hotel management system represents a significant leap forward in automating and streamlining hotel operations. By integrating advanced technologies such as AI-based face verification, OCR for ID processing, and dynamic booking management, the system enhances both operational efficiency and guest satisfaction. The modular architecture ensures that each component, from authentication to booking and guest management, operates seamlessly while maintaining high standards of security and data integrity. The system's userfriendly interfaces, combined with robust backend processes, provide a smooth experience for both guests and hotel staff, reducing manual errors and improving overall productivity

6. FURTHER ENHANCEMENT

Looking ahead, there are several opportunities to expand the capabilities of this hotel management system. One potential area of development is the integration of advanced analytics and machine learning models to provide predictive insights. For instance, the system could analyze booking trends to optimize room pricing dynamically or predict peak seasons to help hotels prepare in advance. Additionally, incorporating AI-driven chatbots for customer support could further enhance the guest experience by providing instant assistance for common queries and booking modifications. Another promising direction is the expansion of the system's IoT (Internet of Things) capabilities. By integrating with smart devices such as room sensors, keyless entry systems, and energy management tools, the system could offer a more personalized and eco-friendly guest experience. Features like automated room temperature adjustments based on occupancy or real-time maintenance alerts could significantly improve operational efficiency. Furthermore, extending the platform to support multi-property management would make it a valuable tool for hotel chains, enabling centralized control and reporting across multiple locations. These enhancements would ensure the system remains at the forefront of innovation in the hospitality industry.

REFERENCES

[1] Zhang, Z., & Chen, Y. (2020). Face Recognition in Unconstrained Environments: A Systematic Review. IEEE Access. DOI:10.1109/ACCESS.2020.2979342

[2] Gupta, S., & Singh, R. (2021). AI-Driven Contactless Check-In Systems: A Case Study in Hospitality Efficiency. Journal of Hospitality and Tourism Technology. DOI:10.1108/JHTT-09-2020-0245

[3] Kumar, A., & Patel, V. (2019). OCR-Based Identity Verification for Secure Guest Onboarding. International Journal of Document Analysis and Recognition (IJDAR). DOI:10.1007/s10032-019-00325-0

[4] Lee, J., & Kim, H. (2022). Privacy-Preserving Biometric Authentication in IoT-Enabled Hotel Systems. Sensors. DOI:10.3390/s22031012

[5] Masi, I., Wu, Y., Hassner, T., & Natarajan, P. (2018). Deep Face Recognition: A Survey. IEEE Transactions on Biometrics, Behavior, and Identity Science.