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Turf Sports Booking Management System using MERN Stack React JS

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ABSTRACT: The Turf Sports Booking Management System is a web-based application developed using the MERN stack (MongoDB, Express.js, React.js, Node.js) to streamline the booking and management of sports facilities. It connects turf owners with users while providing an admin panel for oversight and operational control. The system consists of three main modules: Admin, Owner, and User.The Admin Module allows administrators to view and approve turf Details, user profiles, and owner details to ensure the authenticity and quality of available sports facilities. The Owner Module empowers turf owners to post, manage, and update their turf and sports details, view user bookings, and view feedback. Owners can efficiently maintain accurate listings, monitor booking, and improve service quality. The User Module provides customers with the ability to search for turfs, view sports options, make bookings, and share feedback. Users can manage their profiles This system enhances transparency, reduces manual processes, and provides a user-friendly platform for managing turf bookings, fostering better engagement between turf owners and sports enthusiasts.

KEYWORDS: Admin module, Owner module, User module, web based application, Booking management

I. INTRODUCTION

In today's fast-paced and digitally connected world, the way we access and manage sports facilities has undergone a significant transformation. Traditional methods of manually booking sports turfs or physically visiting turf locations to check availability are now outdated and inefficient. With the rise of digital platforms and growing interest in recreational sports, there is a rising need for an online system that simplifies and automates the entire process. The **Turf Sports Booking Management System using MERN Stack (MongoDB, Express.js, React.js, Node.js)** has been developed to address this need efficiently and effectively.

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his system provides a comprehensive digital solution for users, turf owners, and administrators to interact on a single platform to manage turf-related activities, such as posting turf details, booking sports slots, checking availability,viewing feedback, and more. Designed with a user-centric approach, the platform ensures seamless interaction, easy navigation, and updates, making it an ideal solution for both players and sports facility managers.

Advantages of the System

Convenience: Users can book their preferred sports facility with just a few clicks.
Time-Saving: Avoids manual coordination and physical visits for bookings.
Transparency: Users have clear visibility into turf availability, pricing, and facilities.
Updates: Turf availability and booking updates ensure efficient scheduling.
Centralized Management: Owners can manage all turf and booking details from a singledashboard.
Scalability: The system is designed to handle a large number of users and turf listings, making it suitable for future growth.

II. LITERATURE WORK

In the sports facility management, various studies have explored the development and optimization of online booking systems and resource management. Below is a literature review of five pertinent journal articles, each accompanied by its abstract.

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1. Design and Implementation of Online Booking System of University Sports Venues
Authors: Can Li, Junjie Li, Hongxiang Cao, Zhan Meng
Abstract: To address the imbalanced use of university sports venues, this study focuses on designing an online booking system tailored for the table tennis hall of Zhengzhou University. Drawing from existing systems' experiences both domestically and internationally, the system encompasses functionalities such as user registration and login, online venue booking, online payment, personal center, message board, and database construction. Developed using Java programming language, JSP, MySQL, JDBC, MyEclipse, and Tomcat server, the system successfully facilitates online booking, payment, and messaging. Testing indicates robust performance, effectively enhancing venue management efficiency and meeting the demands for optimized use of university sports facilities.

2. Research on Optimization Management of Sports Venue Facilities Resources Based on Intelligent Scheduling Algorithms
Abstract: This research delves into optimizing the management of sports venue facilities by leveraging intelligent scheduling algorithms. Initially, it analyzes the resource management system for university sports facilities, detailing functional modules like user management, venue management, and equipment management. Utilizing the B/S structure, the system employs the .NET development framework, Java programming language, ASP.NET 3.0, and Oracle 11g as the backend database. The study underscores the practical significance of intelligent management in sports venues, aiming to enhance operational efficiency and resource allocation.

3. The Energy Efficiency Problematics in Sports Facilities
Authors: Not specified
Abstract: This study addresses the challenges of energy efficiency in sports facilities, particularly focusing on identifying savings in daily grass heating operations. It explores the integration of embedded and cyber-physical systems, and information system applications to enhance energy efficiency. The research emphasizes the importance of supervisory holistic control in achieving energy efficiency gains in sports facilities, contributing to sustainable and cost-effective operations.

4. Exploring Innovations in Sports Venue Management in China: Balancing Utilization and Sustainability
Authors: Jianhua Mei, Wenjie Sun, Kecun Chen
Abstract: This paper explores innovative strategies for enhancing the utilization, financial sustainability, and community engagement of sports venues in China. As the industry faces challenges related to underutilization and economic viability, the study emphasizes the importance of multifunctional transformation and community-based operations. By reconfiguring sports venues to host a variety of events beyond traditional sports, operators can significantly increase utilization rates and revenue streams. The integration of digital and smart management technologies is identified as crucial for optimizing operational efficiency and enhancing the user experience. Additionally, the paper highlights the need for diversified revenue models, including retail services, corporate sponsorships, and digital content monetization, combined with sustainable development practices such as energy efficiency and waste reduction. These strategies not only secure the long-term financial health of sports venues but also align with broader environmental and social goals. The study concludes that sports venues adopting these innovative approaches will be better positioned to thrive in a competitive and evolving market landscape.

5. Design and Implementation of a Campus Sports Meet Management System
Authors: Hengli Nie
Abstract: In response to challenges in traditional sports meet management such as managing numerous participants, difficulty in track allocation, complex match statistics, untimely announcements, and information bottlenecks, we have designed an efficient, intelligent, and practical management system for university sports meets. This system facilitates administrators in viewing and modifying information, compiling statistics, entering match results, and managing both competitions and equipment. Users can modify personal information, view match schedules, register for events, view results, and check sports equipment and announcements. This complete system integrates seamlessly with university information service platforms and is highly practical.

III. EXISTING SYSTEM

The current system of turf sports booking relies on manual processes where users must physically visit or contact turf facilities via phone calls or messages to check availability and make reservations. Turf owners manage bookings through paper-based records or simple digital tools like spreadsheets, which can lead to errors and inefficiencies. Users

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often rely on word-of-mouth recommendations or local advertisements to find suitable sports facilities, limiting their access to available options. This system lacks centralized management, making it difficult to track bookings, update turf details, or maintain customer records accurately. Communication between turf owners and users is often unorganized, leading to delays and misunderstandings.

Disadvantages of the Existing System

1.Limited Accessibility: Users need to visit turfs physically or make repeated calls to inquire about availability, leading to inconvenience.

2.Time-Consuming Process: Manual searching and booking require significant time and effort for both users and turf owners.

3.Inaccurate Data Management: Paper records or basic digital tools increase the risk of data loss, double bookings, or errors.

4.Lack of Updates: Users cannot view real-time availability, leading to missed booking opportunities or scheduling conflicts.

5.Inefficient Communication: Poor coordination between owners and users often results in delayed responses and booking confusion.

6.Limited Marketing Reach: Turf owners rely on local advertisements, restricting their ability to reach a broader audience effectively.

IV. PROPOSED SYSTEM

The proposed Turf Sports Booking Management System is an online platform built using the MERN stack (MongoDB, Express.js, React.js, Node.js) to digitize and automate the turf booking process. This system provides separate modules for admins, turf owners, and users, enabling efficient management and seamless communication. Users can search for turfs, view sports details, and book facilities online, while owners can post and manage turf listings, track user bookings, and respond to feedback. Admins can monitor operations, approve new turfs, and ensure data integrity. The system provides user-friendly interfaces, enhancing the overall booking experience.

Advantages of the Proposed System

Automated Booking Process: Users can search, book, and manage reservations online, reducing manual intervention and saving time.

Centralized Management: Turf owners can efficiently manage sports details, bookings, and feedback from a single platform.

Enhanced Communication: Streamlined communication between users, owners, and admins reduces misunderstandings and delays.

Improved Data Accuracy: Digital records minimize errors, prevent double bookings, and ensure accurate information management.

User Convenience: Users can access the platform anytime, anywhere, and easily search for turfs based on location and sports type.

Better Marketing Reach: Turf owners can showcase their facilities to a wider audience, increasing visibility and bookings.

Secure Transactions: Users can make safe and seamless online payments, enhancing trust and reliability.

Feedback Integration: Owners can view user feedback to improve services, ensuring a better customer experience.

Administrative Control: Admins can monitor platform activities, approve new listings, and maintain data integrity.

V. METHODOLOGY

The development of the Turf Sports Booking Management System follows a structured methodology comprising requirement gathering, system design, implementation using the MERN stack (MongoDB, Express.js, React.js, Node.js), and testing. The system is divided into three main modules: Admin, Owner, and User, each with distinct roles and responsibilities. The methodology adopted ensures scalability, modularity, and efficient data handling.

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1. Requirement Analysis

- stakeholders: Admin, Turf Owners, and Users.
- Functional requirements such as registration, login, booking, payment integration, turf management, and verification were outlined.
- Non-functional requirements like scalability, security, and user interface responsiveness were considered.

2. Implementation

- React.js was used to build the user interface with responsive design using CSS frameworks like Bootstrap/Tailwind CSS.
- API integration was achieved through Axios/Fetch for communication between frontend and backend.
- Turf search and filtering functionalities were developed using React hooks and MongoDB queries.
- Admin features include turf approval, user monitoring, and report generation dashboards.
- Turf Owners can manage availability slots, view bookings, and update turf details.
- Users can search turfs, make bookings, view history, and cancel reservations.

3.Testing

- Unit testing was conducted using Jest and React Testing Library for frontend components.
- API testing was carried out using Postman.
- Manual and automated functional testing ensured that all modules performed correctly under various scenarios.
- Cross-browser and responsive testing was done to ensure compatibility across devices.

4. Deployment

- The application was deployed using Vercel/Netlify for the frontend and Render/Heroku for the backend.
- MongoDB Atlas was used as the cloud-based database.
- CI/CD pipelines were integrated to automate deployment and testing.

VI. ARCHITECTURE DESIGN

The system architecture consists of three main user roles: **Admin**, **Owner**, and **User**. Each role performs specific functions:

- **Owner**: Registers and logs in to manage turf details, user bookings, and view feedback.
- **User**: Registers and logs in to search turf details, view sports, make bookings, and post feedback. They can also view their profile and logout.
- **Admin**: Logs in to approve turf registrations and view user and owner details.

Each module interacts through a user-friendly interface developed using the MERN stack (MongoDB, Express.js, React.js, and Node.js), ensuring smooth management and communication between users, owners, anadministrator

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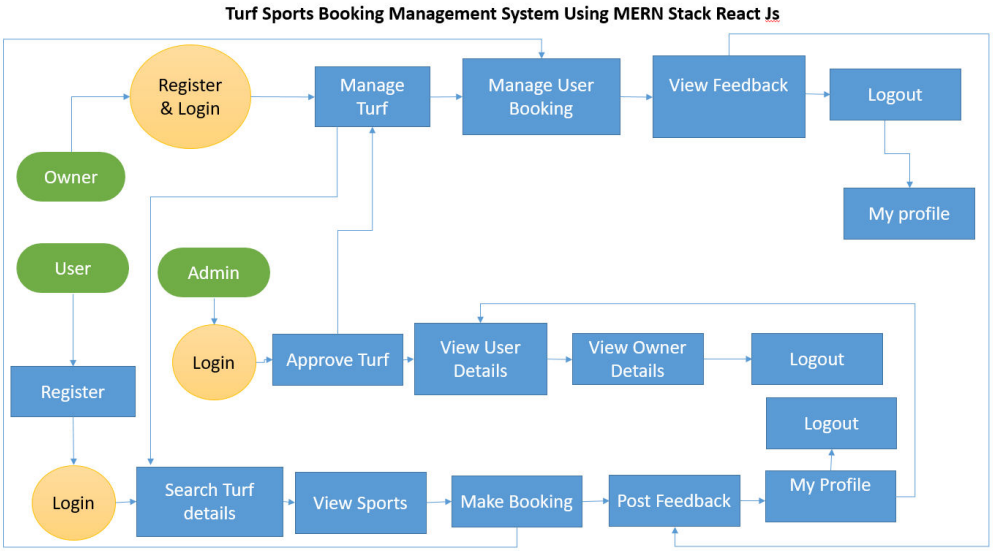

VII. MODULE LIST

ADMIN:

- View & Approve Turf
- View User details
- View Owner Details

OWNER:

- Register
- Login
- Post Turf Details(Academy name, Sports Name, Duration, Date, Address, City, Location, Landmark, Mobile)
- Manage Turf Details
- Add Sports Details(Sports name, Price, Floor)
- Manage Sports Details
- View User Booking
- View Feedback
- View My Profile

USER:

- Register
- Login
- Search Turf
- Check Sports Details
- Make Booking(Name, No.of Persons, Amount, Mobile, Address, Card Details)
- Post Feedback
- View My Booking
- My Profile

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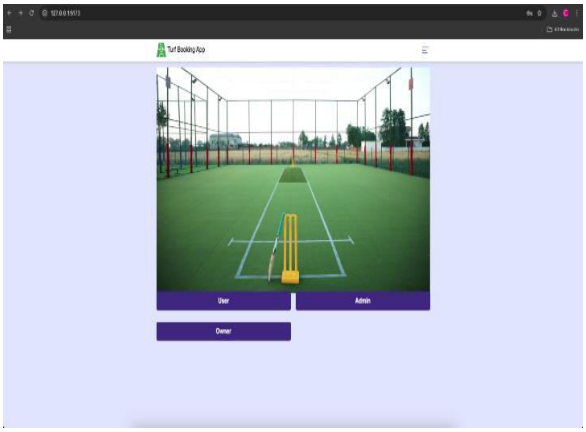
VIII. SCREENSHOT



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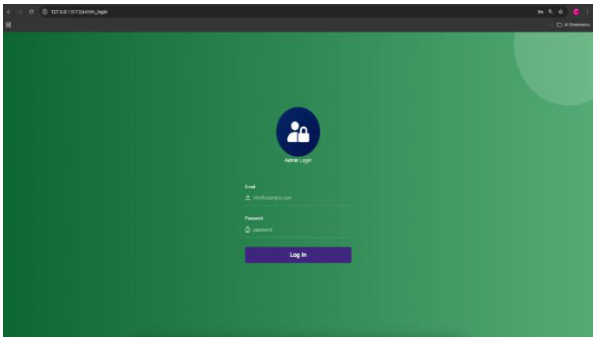
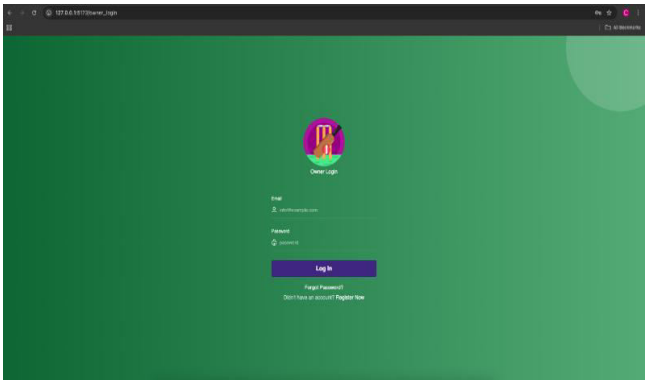


Admin:



Owner:

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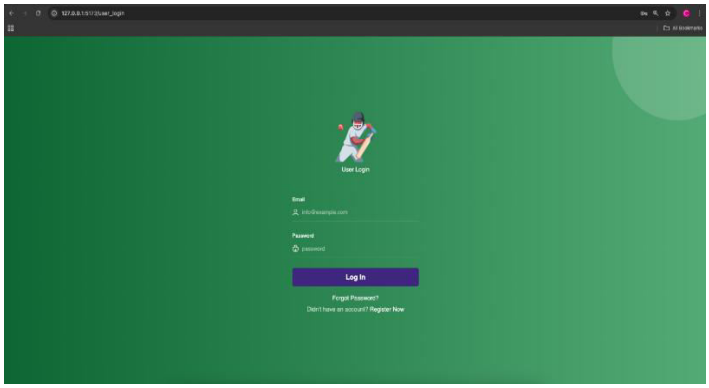

User:

IX. CONCLUSION

The **Turf Sports Booking Management System** using the MERN Stack (Mongo DB, Express.js, React.js, Node.js) provides a robust and scalable solution for streamlining the process of booking sports facilities. By integrating key functionalities such as user registration, turf management, sports detail handling, user bookings, and feedback mechanisms, the system enhances operational efficiency for both users and turf owners. It successfully eliminates traditional manual processes and introduces a seamless, digital experience for sports enthusiasts and administrators alike. Moreover, the role-based structure (Admin, Owner, User) ensures organized access control and smooth interaction among all stakeholders. The platform not only promotes sports culture but also empowers turf businesses with digital visibility and better resource management.

X. FUTURE ENHANCEMENT

To further improve and expand the system, the following enhancements can be considered in future versions:
1.Slot Availability – Integrate booking conflict prevention and dynamic time slot updates.
2.Mobile Application – Develop a mobile app version using React Native or Flutter for enhanced accessibility.
3.Dynamic Pricing Model – Enable owners to set variable pricing based on peak/off-peak hours or weekends.**AI-based Recommendation System –** Use machine learning to recommend turfs or sports based on user preferences and booking history.
5. Feedback Moderation System – Allow admins to manage and filter feedback for quality control and trust.
6. Calendar Sync – Enable syncing with Google Calendar or iCal to help users manage their bookings efficiently.
7. Multilingual Support – Add support for multiple languages to improve accessibility for diverse user bases.

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