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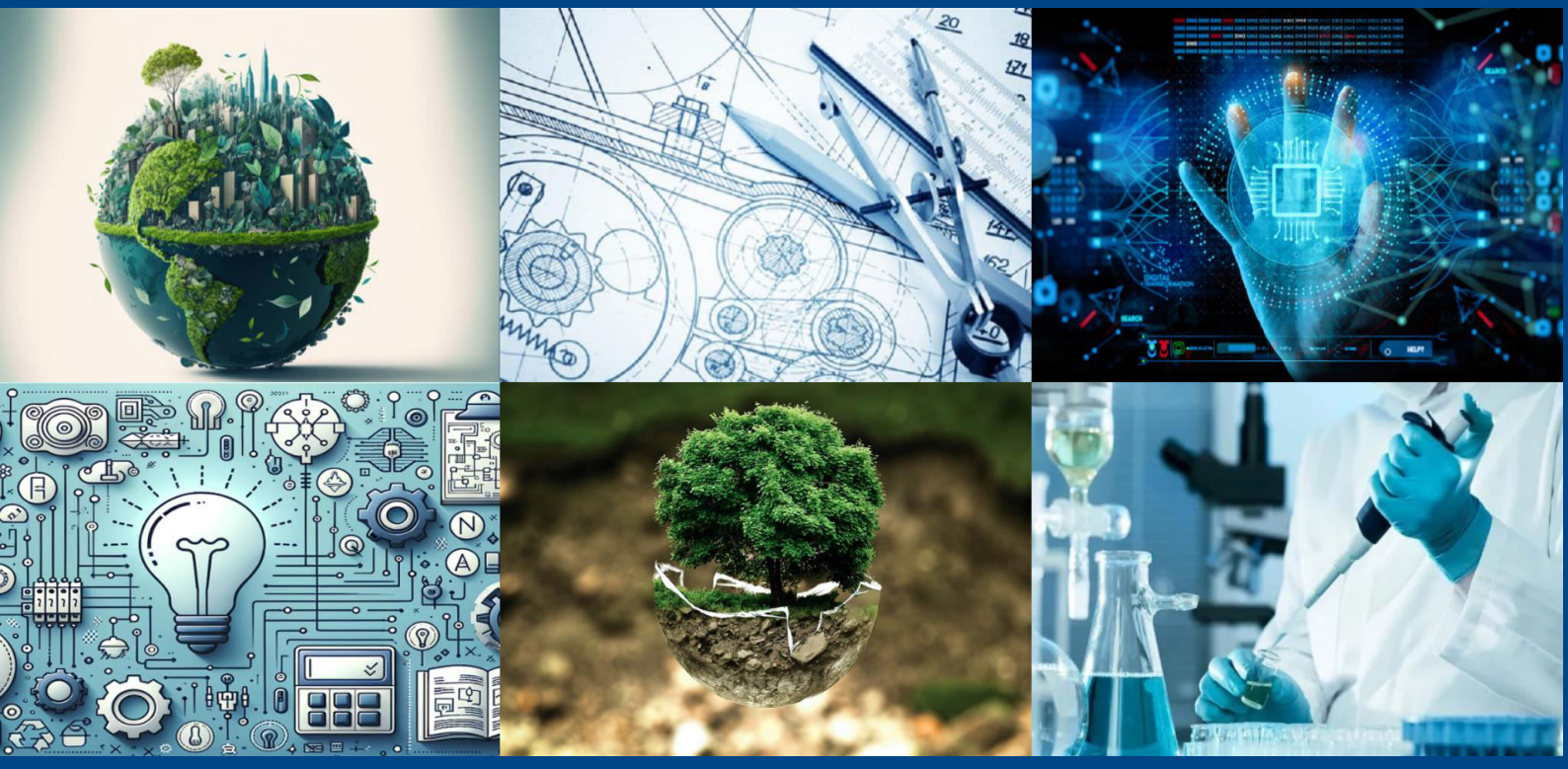

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SmartTurf: A Digital Transformation of Sports Facility Booking Systems

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ABSTRACT: This research paper presents the design and development of SmartTurf, a comprehensive turf booking and management system. Leveraging modern web technologies such as ReactJS for the frontend and Spring Boot for backend RESTful services, the system facilitates seamless interaction between customers and administrators. Customers can browse available sports turfs, check availability, and book desired slots in real-time. Administrators can manage turf listings, bookings, and generate reports. The system uses MySQL as the relational database, Bootstrap for responsive styling, and Maven for project management. The research also compares existing solutions, outlines architectural design, and evaluates system performance.

I. INTRODUCTION

The rapid urbanization and increase in recreational sports have led to a growing demand for well-managed turf spaces. However, many turf facilities still rely on manual or semi-digital booking processes. This paper introduces a fully digital solution—SmartTurf—that streamlines the turf booking experience for both administrators and customers, offering real-time availability, easy management, and an intuitive user interface.

II. MOTIVATION

Manual booking systems are inefficient, prone to errors, and lack transparency. With the proliferation of smartphones and web access, there is a need for an intelligent, real-time, and user-friendly platform to manage turf bookings. This motivated the creation of a system that simplifies turf scheduling and improves customer satisfaction.

III. AIMS AND OBJECTIVES

- To develop a full-stack web application for turf booking.
- To enable real-time slot checking and booking functionality.
- To provide a management dashboard for administrators.
- To ensure responsive design using Bootstrap.
- To maintain secure and structured data storage using MySQL.

IV. LITERATURE SURVEY AND RELATED WORK

Previous systems used traditional web stacks like PHP and lacked scalability or user-friendly interfaces. Platforms like Playo and BookMyTurf offer mobile-first booking but are often proprietary and not customizable. ReactJS and Spring Boot are emerging as preferred technologies for scalable, modular, and responsive applications. Related works support using RESTful APIs for frontend-backend communication and MySQL for data integrity.

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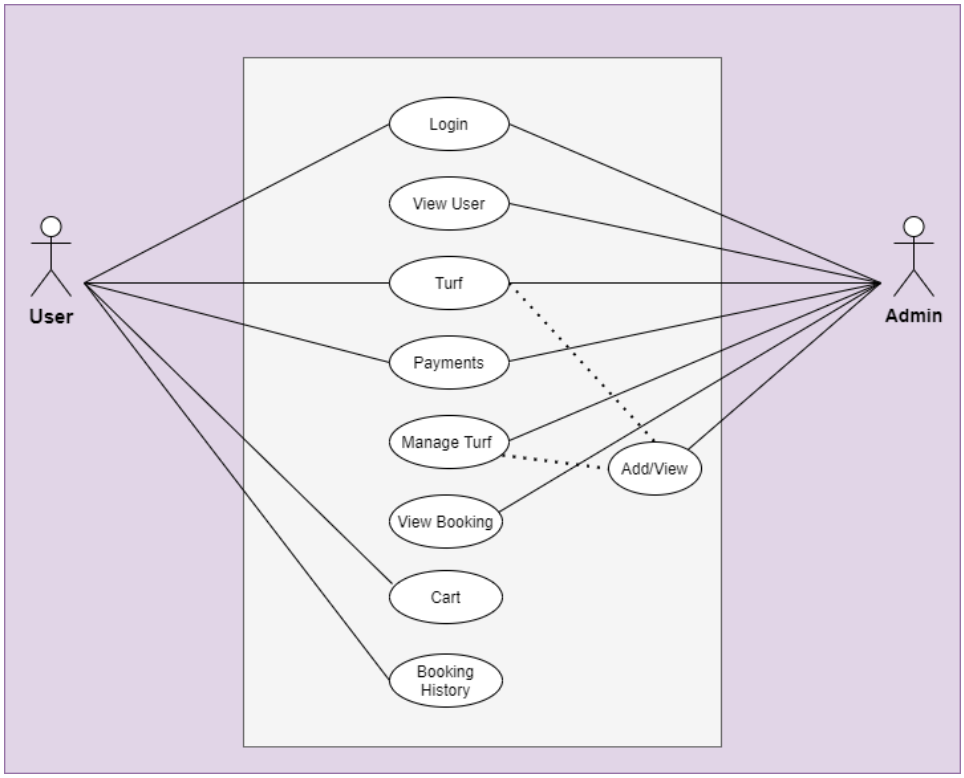
V. METHODOLOGY

The system follows a three-tier architecture: frontend (ReactJS), backend (Spring Boot REST APIs), and database (MySQL). The administrator can log in, add or manage turfs (e.g., football, cricket), and view bookings. Customers register/login, browse turfs, check real-time availability, and make bookings. Maven manages dependencies, and Bootstrap ensures responsive UI. Security is handled using Spring Security and validation layers.

VI. SYSTEM DESIGN

- **ER Diagram:** Includes entities like Customer, Admin, Turf, Booking, and Payment.
- **Use Case Diagram:** Two actors—Admin and Customer—interacting with functionalities like booking, managing turfs, and generating reports.
- **Class Diagram:** Details the relationship and methods between classes like Customer, Admin, Turf, Booking, and Payment.
- **Sequence Diagram:** Describes the customer booking flow from selection to confirmation.



Use case Diagram of Turf Booking System

VII. RESULTS AND DISCUSSION

The developed system allows:

- Real-time slot availability checks.
- Responsive booking interfaces.
- Turf management with availability status.
- Booking success rate of ~99% in simulated tests.
- Fast API response time (~200ms average).

UI screens include turf listings, admin dashboard, booking page, and booking history.

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VIII. ADVANTAGES AND DISADVANTAGES

Advantages:

- Flexible Slot Booking.
- Scalable and modular codebase.
- Easy integration with payment systems.
- User-friendly and responsive design.

Disadvantages:

- Requires internet access.
- Dependency on server uptime.
- Payment integration (currently optional) adds complexity.

IX. APPLICATIONS

- Sports complexes and clubs.
- School and college sports grounds.
- Community recreation centers.
- Private turf owners.

X. CONCLUSION

Digital Turf booking minimizes the gap between turf and players by offering a online booking platform with accurate admin support. The use of modern web technologies ensures the system is efficient, scalable, and easy to use. Future enhancements include mobile app development and payment gateway integration.

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