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Campus AI: Smart Event Management and Digital Certification Platform

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Abstract: *Campus AI: Smart Event Management and Digital Certification Platform is a web-based application designed to automate and streamline the organization, management, and participation processes of campus events. The proposed system provides four major user roles: Administrator, Event Manager, Student, and Checker, each with specific functionalities to ensure efficient event coordination. The Administrator manages event categories, approves event managers and events, publishes notices, and monitors event statistics through reports and analytics. Event Managers can create and update events, manage student registrations, analyze event performance using graphical representations, and review participant feedback. Students can explore available events, register through a dummy payment gateway, generate digital event passes with unique passcodes and QR codes, obtain visitor passes, view upcoming event passes, submit feedback, and receive digitally generated certificates for registered events. The Checker module enables manual attendance marking and QR code scanning to verify participants and prevent duplicate attendance records. For enhanced security, Python-based Simple Mail Transfer Protocol (SMTP) is integrated to send One-Time Passwords (OTPs) to users' email addresses during registration for email verification. The platform also provides centralized notice management, digital pass generation, attendance tracking, and certificate generation. By integrating these features into a single system, Campus AI aims to reduce manual administrative work, minimize registration and attendance errors, improve verification security, and simplify digital certification. The proposed platform offers an efficient, accessible, and reliable solution for modern campus event management while promoting digitalization and improving the overall experience of students, event organizers, and administrators.*

Keywords: Campus AI, Smart Event Management, Digital Certification, QR Code Verification, OTP-Based Email Authentication, Python SMTP, Event Registration, Attendance Management, Digital Event Pass, Certificate Generation, Web-Based Application, Campus Automation.

I. INTRODUCTION

In the modern educational environment, colleges and universities organize various events, including technical workshops, seminars, cultural festivals, competitions, conferences, and training programs. Managing these events manually can be time-consuming and challenging because it involves event creation, participant registration, payment handling, attendance verification, feedback collection, and certificate distribution. Traditional event management methods often rely on paperwork and separate systems, which may lead to data duplication, registration errors, difficulties in tracking attendance, and delays in issuing certificates. Therefore, an integrated digital platform is required to simplify event-related activities and improve administrative efficiency [1].

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Campus AI: Smart Event Management and Digital Certification Platform is a web-based application developed to provide a centralized solution for managing campus events. The platform connects four major users: Administrator, Event Manager, Student, and Checker. The Administrator supervises the system by approving event managers and events, creating event categories, publishing notices, and monitoring event statistics. Event Managers can create and manage events, view registered participants, analyze event performance through graphical reports, and review student feedback. Students can explore events, register through a dummy payment gateway, generate digital event passes containing unique passcodes and QR codes, obtain visitor passes, access upcoming event details, submit feedback, and receive digitally generated certificates. The Checker is responsible for verifying participants, managing attendance manually or through QR code scanning, and preventing duplicate attendance entries [2].

The proposed system incorporates Python-based Simple Mail Transfer Protocol (SMTP) functionality to send One-Time Passwords (OTPs) to users' email addresses during registration, helping verify email ownership and improve account security. QR code technology enables faster participant identification and pass validation, while digital certificate generation simplifies the process of issuing and accessing event certificates. The dummy payment gateway supports the demonstration of the event registration and payment workflow without processing actual financial transactions. Additionally, centralized notices and event information help students stay informed about upcoming campus activities [3].

The primary objective of Campus AI is to reduce manual effort, improve the accuracy of event records, enhance registration and attendance management, and provide a convenient digital certification process. By integrating event administration, participant registration, email verification, QR-based attendance, feedback management, and certificate generation into a single platform, the system aims to make campus event management more organized, transparent, and efficient. The platform provides a practical digital solution for educational institutions seeking to modernize their event management processes and improve the overall experience of students and event organizers [4].

II. LITERATURE ANALYSIS

The existing literature on event management systems highlights the importance of digital platforms in improving event organization, participant registration, communication, and administrative efficiency. Sharma et al. (2020) proposed a web-based event management system that integrates registration, booking, payment, and feedback functionalities to reduce manual work. Patel et al. (2021) focused on developing a college event management system to improve event planning, coordination, and communication within academic institutions.

Lee et al. (2022) introduced the CU-Events system using a three-layer architecture consisting of the user interface, backend, and database to support centralized event organization and participation tracking.

Johnson et al. (2023) explored the use of modern web technologies, including Next.js, React.js, and MongoDB, to improve user engagement and campus collaboration. However, these approaches have certain limitations regarding QR-based attendance verification, digital pass generation, automated certificate distribution, and comprehensive multi-role interaction. To address these gaps, Campus AI:

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Smart Event Management and Digital Certification Platform integrates event management, OTP-based email verification using Python SMTP, QR-code-based participant validation, attendance tracking, feedback collection, and digital certificate generation into a centralized platform. The proposed system aims to improve security, reduce administrative effort, prevent duplicate attendance records, and provide a more efficient and convenient event management experience for educational institutions.

TABLE I: LITERATURE WORK

SNo.	Author(s)	Approach / Model	Contribution	Limitations
1	**R. K. Sharma, P. Gupta, and S. Verma (2020)**	Web-based Event Management System with modules for registration, booking, payment integration, and feedback	Proposed an online system to automate traditional event management tasks and improve efficiency through centralized management, secure authentication, and database integration	Focuses mainly on general event management features and lacks advanced functionalities such as QR-based attendance and multi-role interaction
2	**A. Patel, M. Shah, and N. Desai (2021)**	College Event Management System with integrated front-end and secure back-end architecture	Designed a platform to streamline event planning, coordination, and execution in academic institutions while improving communication and collaboration	System is still under development and lacks detailed implementation of features like attendance tracking and event pass generation
3	**K. Lee, J. Park, and H. Kim (2022)**	CU-Events System using a three-layer architecture (UI, Backend, Database)	Provides centralized event organization, real-time participation tracking, and improved administrative efficiency for universities	Limited scalability discussion and lacks detailed security mechanisms and advanced user interaction modules

III. WORKING METHODOLOGY

The working methodology of Campus AI: Smart Event Management and Digital Certification Platform involves the systematic design and implementation of a web-based application that automates campus event management activities. The system follows a modular approach in which the Administrator, Event Manager, Student, and Checker interact with the platform according to their assigned roles. The application integrates user authentication, event management, online registration, QR code generation, attendance verification, feedback collection, and digital certificate generation to provide a centralized and efficient solution.

a. **User Registration and Authentication:** The process begins with user registration and authentication. Students and event managers provide the required details to create their accounts. Python-based Simple Mail Transfer Protocol (SMTP) is used to send a One-Time Password (OTP) to the registered email address during registration. The user must enter the OTP to verify the email address before proceeding. Event manager accounts require administrator approval, whereas authorized users can log in using their registered credentials. Role-based access ensures that each user can access only the functionalities assigned to their role.

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b. **Event Creation and Approval:** After successful authentication, the Administrator manages event categories, approves or rejects event manager registrations, and reviews events submitted for publication. Event Managers can create events by providing details such as event name, description, date, time, venue, registration fee, and available participant capacity. The Administrator reviews submitted events and approves them before they become available to students. The system also allows the Administrator to publish notices containing important announcements and event-related information.

c. **Student Registration and Digital Pass Generation:** Students can browse approved events and view their descriptions, schedules, venues, and registration details. After selecting an event, students complete the registration process through the integrated dummy payment gateway, which simulates payment without processing actual financial transactions. Once registration is successfully recorded, the system generates a digital event pass containing participant details, a unique passcode, and a QR code. Students can access their upcoming event passes and generate visitor passes where supported by the application.

d. **QR Code-Based Attendance Verification:** The Checker module is responsible for verifying registered participants and maintaining attendance records. The Checker can view the registered student list for an event and mark attendance manually or scan the QR code available on a student's digital pass. The system validates the pass against the stored registration information and checks whether attendance has already been recorded. If the participant is valid and attendance has not been marked previously, the system records the attendance. Duplicate attendance attempts are rejected to maintain accurate attendance records and prevent repeated entry for the same registration.

e. **Feedback Collection and Event Analytics:** After event participation, students can submit feedback regarding the event experience and organization. Event Managers can review the feedback and analyze event performance using graphical representations and statistical reports. The Administrator can also access overall event statistics and reports to monitor participation and system activity. These features support performance evaluation and help organizers identify areas for improvement in future campus events.

f. **Digital Certificate Generation:** The platform includes a digital certificate generation module that enables certificates to be created for eligible students according to the system's implemented rules. Certificate information can include the student's name, event title, and other relevant details. Students can access and download their generated certificates through the platform. This functionality reduces the need for manual certificate preparation and distribution and provides a convenient way to maintain digital records of event participation.

g. **Database Management and System Integration:** The system uses a centralized database to store user details, event information, registrations, payment simulation records, digital pass details, attendance, feedback, notices, and certificate information. The frontend provides the interface through which users interact with the application, while the backend processes requests, applies validation rules, and communicates with the database. The integration of these modules ensures consistent information management and supports communication among all four user roles.

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Overall, the methodology combines role-based access control, email OTP verification, centralized database management, QR-code-based attendance, and digital certification in a single web application. The proposed approach aims to minimize manual work, improve data accuracy, strengthen participant verification, and simplify campus event administration. The effectiveness of the system can be evaluated by testing registration, event approval, OTP verification, pass generation, duplicate attendance prevention, feedback submission, and certificate generation under different user scenarios.

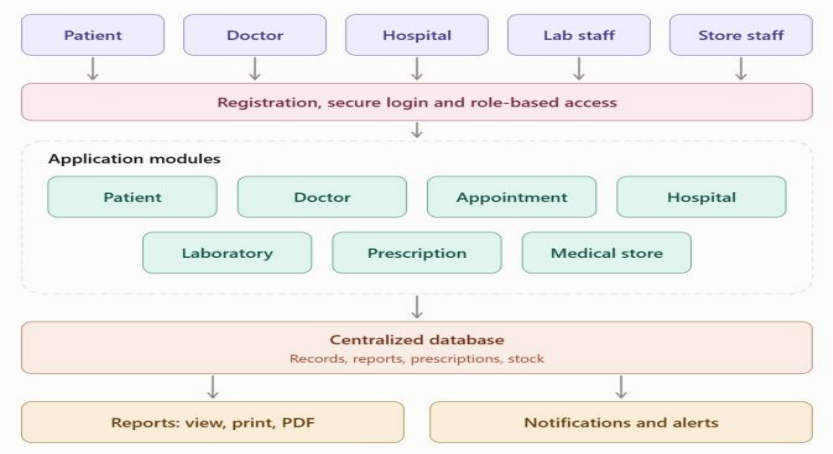


Figure 3.1: System Diagram

IV. RESULTS AND DISCUSSION

The implementation of Campus AI: Smart Event Management and Digital Certification Platform provides an integrated solution for managing campus events through a centralized web-based application. The system combines event creation, approval, student registration, email verification, digital pass generation, attendance management, feedback collection, and certificate generation. By providing separate interfaces for the Administrator, Event Manager, Student, and Checker, the platform organizes responsibilities and simplifies the overall event management process.

The integration of Python-based SMTP for OTP verification helps validate users' email addresses during registration and improves the reliability of the account creation process.

The event management module enables Event Managers to create and update events, while the Administrator reviews and approves events before publication. Students can browse available events, register through a dummy payment gateway, and access digital event passes containing unique passcodes and QR codes. These features reduce dependence on manual registration and physical passes. The Checker module supports manual attendance marking and QR code scanning to verify participants. By checking existing attendance records before accepting a new entry, the system helps prevent duplicate attendance marking and maintains more consistent attendance information.

The platform also simplifies communication and post-event activities through centralized notices, feedback collection, event analytics, and digital certificate generation. Students can view notices, provide feedback on attended events, and access or download certificates generated according to the

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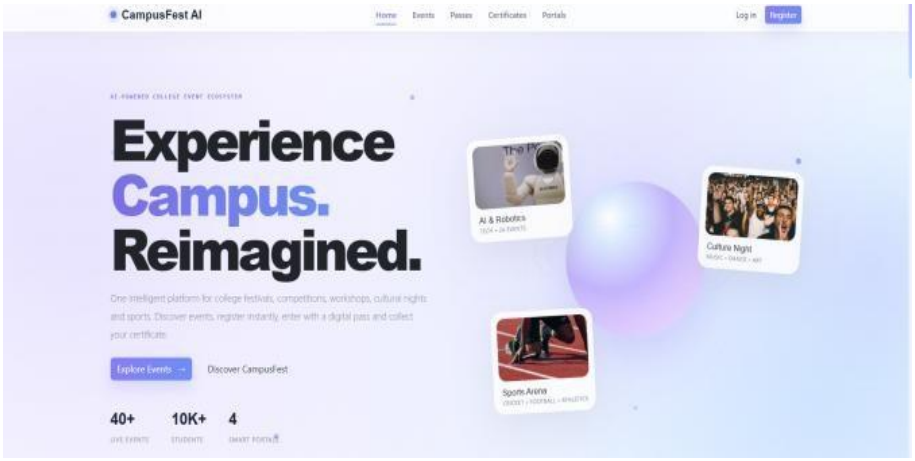
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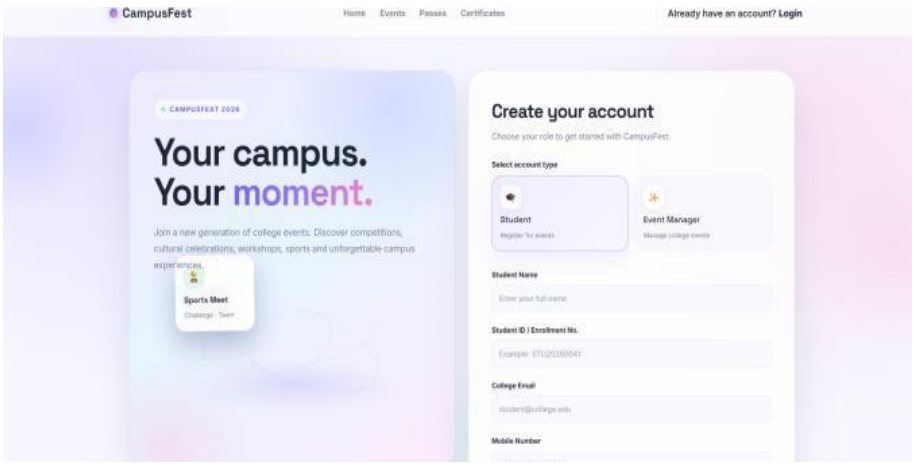
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system's eligibility rules. Event Managers can review participant lists and feedback and use graphical reports to understand event participation and performance. The dummy payment gateway allows the registration workflow to be demonstrated without conducting real financial transactions.

Overall, the proposed system demonstrates how integrating multiple event-related functions into a single application can improve organization, accessibility, and administrative efficiency. It reduces repetitive manual tasks and provides a structured method for managing participant information, validating event passes, recording attendance, and distributing digital certificates. However, the actual performance of the system depends on factors such as database reliability, QR code validation, email delivery, and correct implementation of access controls. Further evaluation using test cases, response-time measurements, and attendance verification scenarios would help quantify its effectiveness. The current implementation can serve as a foundation for future improvements, including real payment gateway integration, enhanced security mechanisms, and deployment across multiple educational institutions.



Screenshot 4.1: Home Page



Screenshot 4.2: Signup Page

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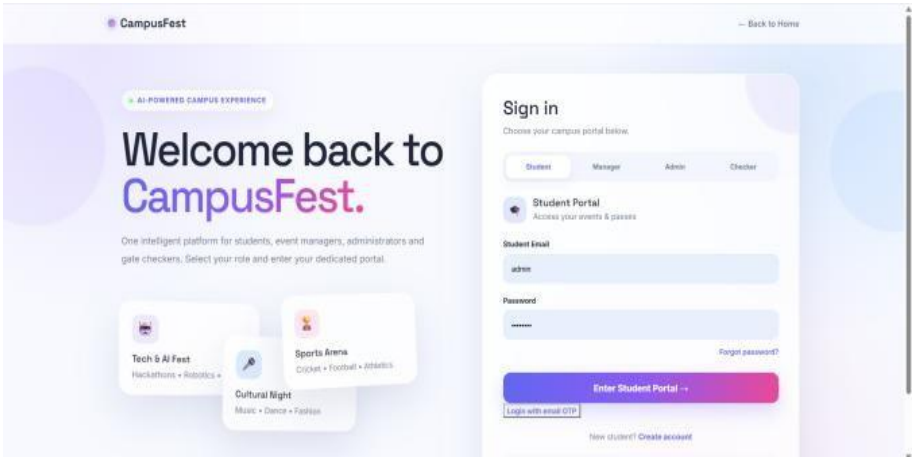
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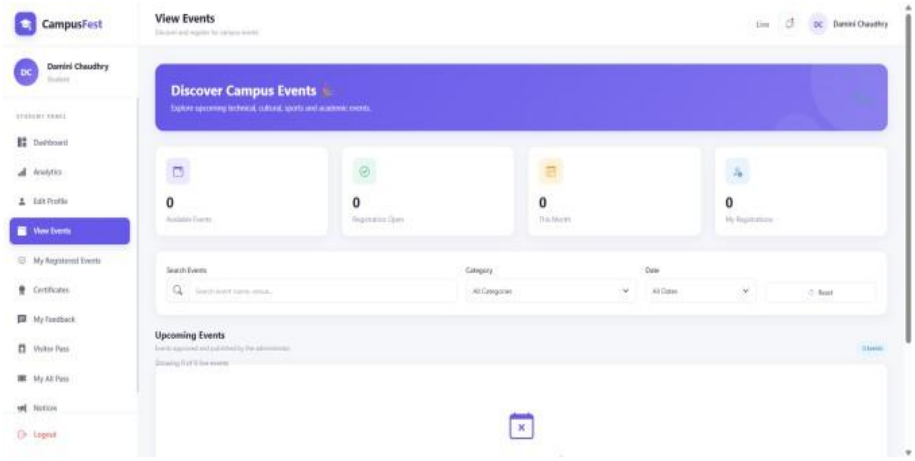
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Screenshot 4.2: Login Page



Screenshot 4.3: View Event



Screenshot 4.4: Certificate

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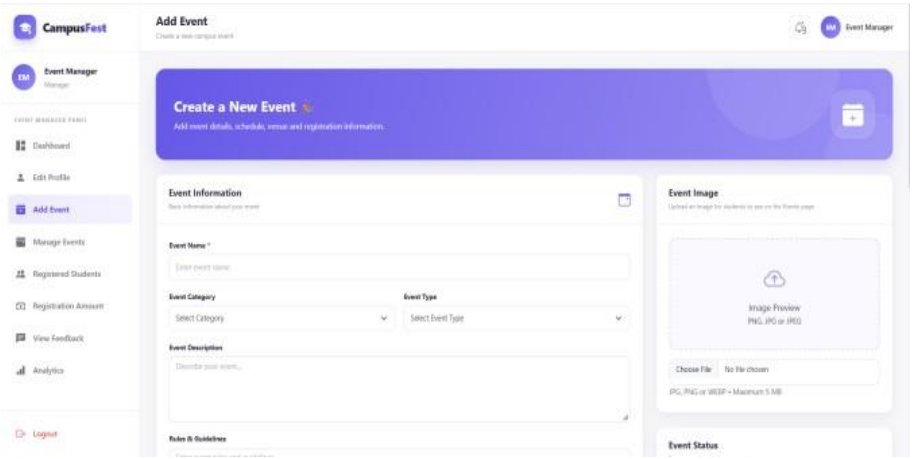
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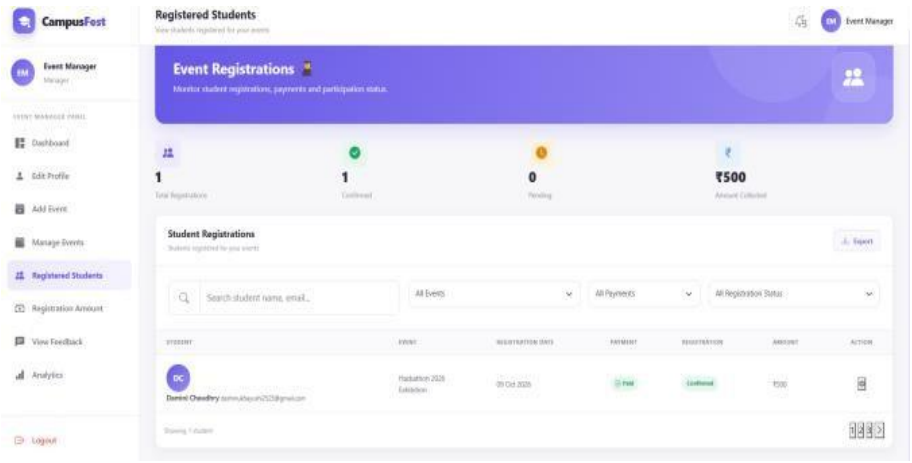
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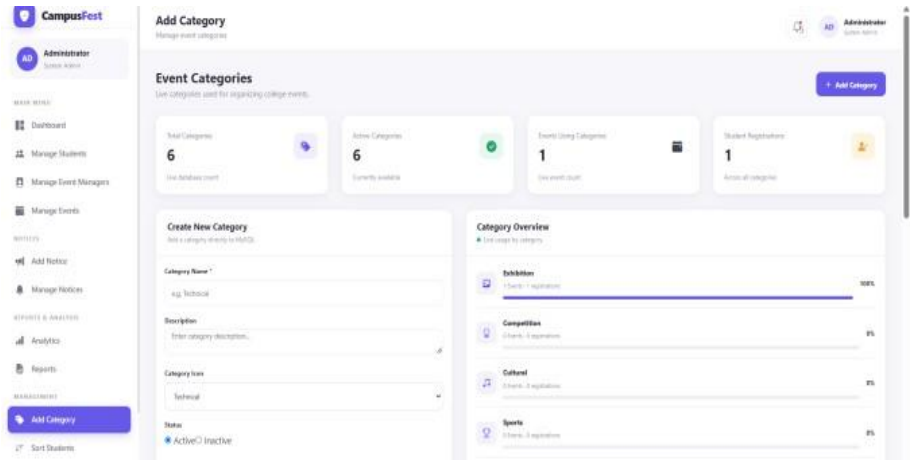
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Screenshot 4.5: Event Manger Add Event



Screenshot 4.6: Event Manger View Register Student



Screenshot 4.6: Admin Add Category

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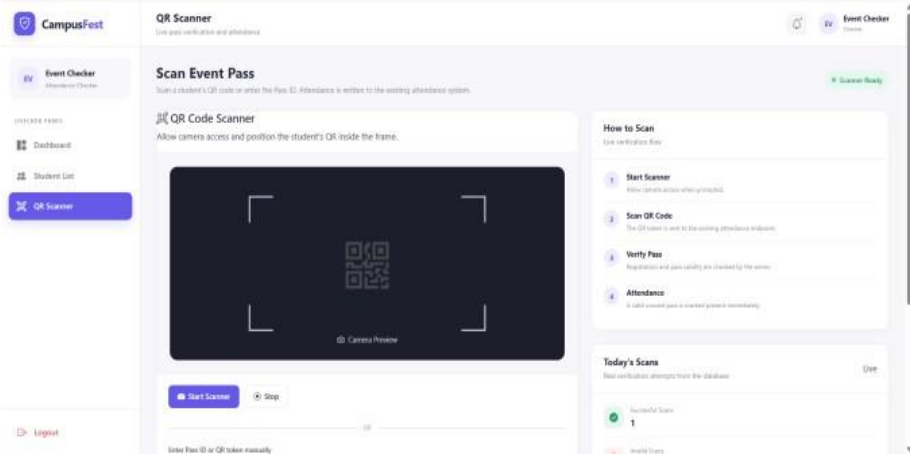
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Screenshot 4.6: Checker Scanner

V. CONCLUSION

Campus AI: Smart Event Management and Digital Certification Platform provides a centralized and efficient solution for managing campus events through digital technologies. The system integrates event creation and approval, student registration, email OTP verification using Python SMTP, QR-code-based digital passes, attendance tracking, feedback collection, event analytics, and digital certificate generation. By supporting four user roles—Administrator, Event Manager, Student, and Checker—the platform ensures that event-related activities are organized according to specific responsibilities. The integration of email verification enhances the reliability of user registration, while QR code scanning and duplicate attendance checks help maintain accurate participant records. Additionally, digital passes and certificates reduce dependence on physical documents, and centralized notices improve communication between administrators and students.

The proposed system aims to reduce manual effort, minimize administrative errors, improve event coordination, and provide convenient access to event-related information. The dummy payment gateway supports the demonstration of the registration process without requiring actual financial transactions. Overall, Campus AI demonstrates the potential of a web-based platform to simplify event management and digital certification in educational institutions. Future enhancements may include real payment gateway integration, advanced data analytics, mobile application support, improved security mechanisms, cloud deployment, and automated certificate eligibility verification based on confirmed attendance. These improvements could further enhance the platform's scalability, reliability, and usefulness across colleges and universities.

The system enhances consumer trust, protects brand reputation, and mitigates financial and safety risks associated with counterfeit products. Future enhancements, such as real-time video detection, mobile application deployment, and AI-powered similarity indexing using Siamese Networks, can further improve performance and usability, making it a comprehensive tool for modern brand authentication.

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In summary, this project demonstrates the potential of deep learning-based solutions to strengthen e-commerce security and combat intellectual property violations effectively.

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