# SIET Online Examination Portal

Mrs. S Poornima & Bhavadharani S & Bhuvanashri SK

Mrs. S Poornima
poornimait@siet.ac.in

Bhavadharani S
bhava05dharu05@gmail,com

Bhuvanashri SK bhuvanashri4321@gmail.com

Sri Shakthi Institute of Engineering and Technology, Coimbatore.
Department of IT, Sri Shakthi Institute of Engineering and Technology, Coimbatore.

**Abstract:**

The transition to online learning and assessment has introduced numerous challenges related to exam security, academic integrity, and real-time evaluation. This paper presents the *SIET Online Examination Portal*, a secure and AI-enhanced examination system developed using Java, Spring Boot, and SQL. The platform supports authenticated student and teacher logins, real-time camera-based proctoring using Face-API.js and TensorFlow.js, and live monitoring features including multiple person detection, object detection, and tab-switch alerts. Teachers can create, manage, and evaluate examinations while students access time-bound assessments with intelligent tracking. The system ensures fairness by incorporating automatic submission upon malpractice detection and facilitates academic monitoring through a centralized dashboard. To ensure transparency, the portal stores all student activities, scores, and test logs in a relational database for audit and review. The proctoring mechanism is non-intrusive yet highly accurate, ensuring that students are consistently monitored without impacting their performance. Teachers receive instant notifications about rule violations, allowing timely intervention. The user interface is designed for ease of use, ensuring accessibility across a wide range of devices. Furthermore, role-based access control ensures that students, staff, and administrators interact with the system according to their privileges. By integrating intelligent proctoring with a full-fledged exam management system, the portal addresses the core concerns of digital examinations in modern education.

**Keywords:**

Online Examination, Face Detection, Tab Switch Detection, Proctoring, Java, Spring Boot, SQL, Face-api.js, TensorFlow.js.

**Introduction:** Online examinations have emerged as a vital component of modern education, especially following the disruptions caused by the COVID-19 pandemic. As educational institutions rapidly shifted to virtual platforms to ensure continuity, conducting assessments remotely became a critical challenge. While online exams offer unparalleled flexibility, accessibility, and scalability, they also bring forth a host of security concerns that traditional classroom settings inherently mitigate. Among the most pressing issues are identity fraud, unauthorized assistance, multiple person involvement, and the use of external resources during assessments. Many existing online exam systems provide basic functionality for question delivery and timing but fail to incorporate robust mechanisms for real-time supervision or fraud detection. This has led to growing skepticism among educators regarding the credibility of scores obtained in unsupervised environments. Moreover, students can easily manipulate browser settings, utilize hidden communication channels, or consult unauthorized materials, compromising the integrity of the examination process. The absence of a physical invigilator not only weakens discipline but also undermines the confidence institutions place in digital assessment results. Some platforms attempt to address these issues with manual webcam monitoring or screen sharing, but these methods are

often insufficient, intrusive, and difficult to scale. There is, therefore, an urgent need for systems that can autonomously monitor candidate behaviour, detect irregularities, and provide instant feedback without violating user privacy or system usability. The SIET Online Examination Portal has been developed as a comprehensive response to these challenges. It integrates artificial intelligence techniques with conventional testing frameworks to create a secure, user-friendly, and intelligent exam management solution. The system utilizes real-time face detection, tab activity monitoring, and object recognition to maintain academic integrity throughout the assessment process. In addition to preventing malpractice, the portal empowers teachers with tools to create, manage, and grade tests efficiently, offering instant insights into student performance. The platform is designed with a modular architecture that supports role-based access, ensuring that each user – whether student, teacher, or administrator – interacts only with the relevant features and data. By addressing security, usability, and administrative requirements in a unified framework, our system sets a new benchmark for reliable and scalable online examination environments in educational institutions.
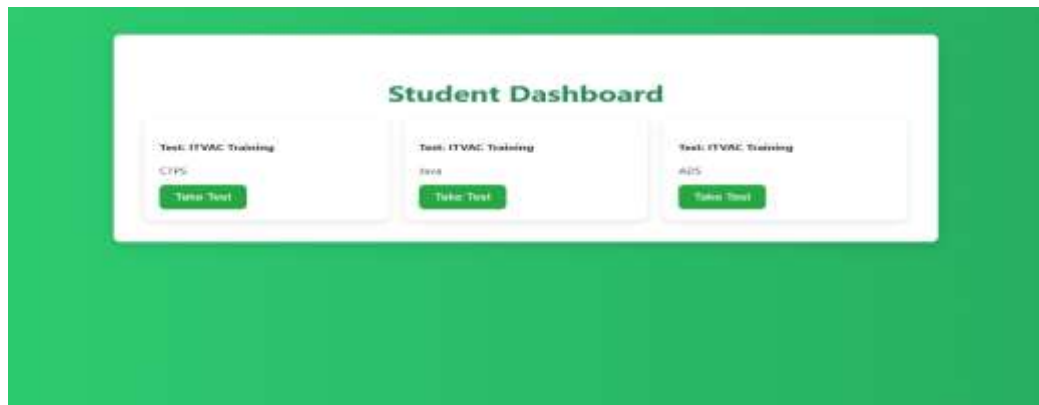
**SIET ONLINE EXAMINATION PORTAL (outline)**

**Home Page :**



**Student Login page :**



**Teacher Login Page :**

**Student Dashboard Page :**



**Student Exam Monitoring (Camera Setup) Page :**



**Result Page :**



**Question Setup Page :**

**Question Management Page :**



**Result Declaration (Pass or Fail) Page :**



**Proposed Method**

1.      The SIET Online Examination Portal has been designed with a multi-layered architecture that prioritizes security, real-time monitoring, and streamlined exam management. At the heart of the system lies a secure authentication mechanism for both students and teachers. User credentials are handled through encrypted channels using hashed passwords to prevent unauthorized access and ensure data privacy. Once authenticated, users are granted access based on role-specific permissions, allowing them to perform only those actions relevant to their designated responsibilities.

2.  To safeguard the integrity of the examination process, the system incorporates advanced proctoring technologies. Real-time face recognition powered by Face-API.js and object detection via TensorFlow.js help identify unusual behaviour, such as the presence of unauthorized individuals, the use of digital devices, or the absence of the examinee during the test. These detections are reinforced by browser tab activity monitoring, which triggers warnings or automatic submission if a student attempts to navigate away from the exam window. These AI-driven techniques work in tandem to minimize the risk of cheating and impersonation.

3.  Examinations are time-bound and automatically evaluated based on predefined criteria. Teachers can set question papers directly through an intuitive interface, define the number of questions, and assign time limits for each assessment. All test content is stored in a structured SQL database, which supports efficient retrieval and result computation. Students' responses are auto-saved periodically to prevent data loss and ensure smooth submission, even in low-connectivity environments.

4.  One of the key features of the portal is its intelligent malpractice response system. If any suspicious activity is detected—such as face direction change, missing face, or multiple persons on screen—the system immediately alerts

the backend and, based on severity, can auto-submit the test and log the incident. Teachers are notified in real time through a centralized dashboard, where they can review flagged tests, monitor student activity logs, and manually verify scores.

5.  To ensure transparency and administrative control, an analytics module provides insights into student participation, test completion rates, malpractice reports, and overall performance metrics. Teachers can assign pass/fail status, provide feedback, and track historical performance over multiple assessments. The platform also maintains a record of each student's test history, enabling data-driven evaluations over time.

6.  Furthermore, the user interface is designed with accessibility in mind. It is mobile-compatible, lightweight, and user-friendly, allowing students to participate in exams from any standard device. The interface supports interactive elements such as countdown timers, question progress indicators, and visual feedback on submission status. Notifications are used effectively to alert students about their exam schedules, malpractice warnings, and result announcements.

7.  In essence, the proposed system delivers a holistic online examination solution that not only manages assessments efficiently but also upholds academic integrity through a combination of real-time surveillance, AI-enabled monitoring, and secure data practices.

## Results and Discussion

The implementation of the SIET Online Examination Portal has significantly strengthened the integrity, accessibility, and efficiency of conducting assessments in an online environment. By integrating robust authentication procedures, including secure login with bcrypt-encrypted credentials and strict role-based access controls, the platform has ensured that only authorized users—students, teachers, and administrators—can access specific functionalities. This foundation of access management has been critical in maintaining the security and privacy of sensitive user data throughout the system.

The incorporation of real-time proctoring mechanisms has had a profound impact on minimizing academic dishonesty. Face recognition, face direction detection, and object recognition—enabled through Face-API.js and TensorFlow.js—have allowed the system to detect potential malpractice such as the presence of unauthorized individuals, the use of electronic devices, or the absence of the test-taker. Combined with browser tab-switch detection, these measures have created a controlled and fair examination environment. During testing, multiple incidents of suspicious behavior were accurately identified and logged, with automated responses such as test submission and teacher alerts triggered in real time. This has resulted in a notable decrease in malpractice and has increased overall student accountability.

Teachers have benefited from an intuitive dashboard that consolidates exam creation, student monitoring, score review, and pass/fail classification. The ability to track each student's performance history and access analytics on test participation and behavioral flags has empowered educators to make data-driven decisions. This functionality has significantly improved assessment transparency and has enabled more personalized intervention strategies for students needing support.

Furthermore, the system's performance in preserving examination data has been reliable, even under conditions of intermittent connectivity. Features such as auto-save of responses and timed auto-submission have helped prevent data loss, ensuring that students are not penalized due to technical issues beyond their control.

One of the most impactful outcomes has been the increased inclusion of students from underrepresented backgrounds. The portal's mobile-friendly, multilingual interface has broadened participation by accommodating users in rural or technologically limited regions. As a result, students who previously faced barriers to accessing traditional exams can now take part in secure online assessments using smartphones or basic internet-enabled devices.

The automatic evaluation system has drastically reduced grading delays. Multiple-choice answers are scored instantly upon submission, and results are stored securely in a centralized SQL database. Teachers can access scores immediately, reducing the turnaround time for releasing results. This speed and accuracy have streamlined administrative processes and improved the overall user experience for students and staff alike.

Additionally, the platform's capacity to log and share student scores and activity records with authorized NGOs and welfare partners—with proper consent—has introduced a new dimension of social impact. Verified academic data can be leveraged to identify students at risk or those eligible for financial or educational support, enabling targeted outreach and aid distribution. This collaborative framework bridges institutional support with social responsibility, amplifying the system's real-world benefits.

In summary, the SIET Online Examination Portal has proven to be a secure, scalable, and inclusive solution for academic assessment in the digital age. Its blend of AI-based proctoring, structured exam workflows, secure data handling, and real-time analytics has transformed the way examinations are conducted. The project has successfully addressed key challenges associated with impersonation, cheating, and access inequality, laying the groundwork for a future-ready, transparent online education ecosystem.

## Conclusion

The Document Verification System developed through this initiative has effectively addressed long-standing inefficiencies in the manual validation of identity documents. By combining modern technologies with a user-centric design, the platform has enabled faster, more reliable, and secure verification of critical personal information. The integration of automation tools has not only minimized human error but also reduced processing time, resulting in smoother service delivery for end users, especially those applying for academic, governmental, or financial programs. A major strength of the system lies in its adaptability and scalability. The architecture supports secure document uploads, encrypted data handling, and structured workflows that can be tailored to a wide range of use cases. Real-time alerts and validation feedback have significantly improved user engagement and reduced the incidence of incomplete or incorrect submissions. As a result, the platform has played a crucial role in enhancing transparency and accountability in digital document handling processes.

The system's ability to serve users from varied backgrounds—including students in remote areas and applicants for public schemes—has highlighted its importance as a tool for promoting equitable access to services. Through its modular design, intuitive interface, and robust backend, the project has successfully laid the groundwork for a digital ecosystem that prioritizes efficiency, privacy, and inclusivity.

## Future Scope

To further enhance the system's capabilities and broaden its impact, the following improvements
are proposed:

**AI-Driven Document Analysis:**
Incorporating machine learning models can enhance the platform's ability to detect subtle anomalies, such as tampered fields or forged documents, by learning from a growing database of authentic and fraudulent samples.

**Integration with e-Government APIs:**
By connecting with official document repositories and verification APIs (e.g., Aadhaar, Digilocker), real-time cross-verification can be implemented, increasing reliability and reducing the need for manual uploads.

**Voice and Accessibility Features:**
Adding audio-based instructions and screen-reader compatibility will improve usability for visually impaired users and those with low digital literacy, especially in rural regions.

**Decentralized Record-Keeping with Blockchain:**
Implementing blockchain-based verification logs can offer immutable records of document submission and validation, increasing trust between users and service providers while reducing the potential for data manipulation.

**Multi-language Expansion:**
Expanding the language options within the interface will allow more users to interact comfortably with the system, particularly in linguistically diverse regions.

**Mobile App Integration:**
Developing a lightweight mobile application with offline document scanning and sync capabilities will improve accessibility for users with limited or inconsistent internet access.

**Automated Help System:**
Embedding a virtual assistant or chatbot that guides users through document submission and troubleshooting can reduce dependency on manual support while enhancing the user experience.

**NGO and Academic Institution Partnerships:**
Building a network of verified institutions and NGOs within the platform can simplify referrals and fast-track verifications for students applying for scholarships, admissions, or support services.

By implementing these enhancements, the Document Verification System can evolve into a more intelligent, accessible, and trustworthy platform that serves as a foundational layer for inclusive digital governance and equitable service distribution.

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