Code Tracker - Online Test Integrity System

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***Abstract*—The rise of online assessments and remote learning has introduced new challenges in ensuring academic integrity and efficient examination management. Traditional invigilation methods are time-consuming and prone to human errors, making it necessary to implement automated solutions. "Code Tracker – Online Test Integrity System" addresses these issues by integrating advanced monitoring technologies, automated exam scheduling, and real-time malpractice detection. The system leverages artificial intelligence to track student activities, prevent cheating, and provide comprehensive reports to administrators.**

By using real-time camera monitoring, Code Tracker can detect suspicious activities such as unauthorized device usage, eye movement anomalies, and multiple person presence. Additionally, it sends automated warnings and notifications in case of rule violations, significantly reducing manual intervention. The system also enhances efficiency through automated exam distribution, ensuring students access the correct assessments at designated times.

Another key aspect of the system is its robust data analytics feature, which continuously evaluates student performance and flagged behaviours. This information helps educators identify weak areas and improve exam strategies. Moreover, time management tracking assists in analysing the time spent by students on each question, offering insights into difficulty levels and academic trends.

Overall, Code Tracker ensures a fair, secure, and transparent examination process by combining AI-driven proctoring, automated scheduling, and intelligent data analytics. The system significantly minimizes human oversight, making it a scalable solution for educational institutions and corporate assessments. Future advancements may include biometric authentication and speech recognition to further enhance security measures.

***Index Terms*—Code Tracker, Online Test Integrity, Coding Activity Management, Performance Evaluation, Cheating Prevention**

I.INTRODUCTION

With the growing adoption of online assessments and remote learning platforms, ensuring secure, efficient, and fair evaluation processes has become crucial. Traditional examination methods rely on manual invigilation, which is time-consuming, prone to human errors, and inefficient for large-scale assessments. Additionally, maintaining exam integrity in remote environments presents challenges, such as unauthorized assistance, impersonation, and plagiarism.

To address these issues, the "Code Tracker – Online Test Integrity System" offers an advanced, AI-driven examination framework that enhances security, efficiency, and fairness in online assessments. The system automates the entire examination process, from scheduling tests to tracking user activities and detecting malpractice in real time. By leveraging computer vision, AI-based proctoring, and behavioural analysis, it ensures that students adhere to exam regulations while reducing the need for human supervision.

One of the key features of "Code Tracker" is its real-time malpractice detection mechanism. The system continuously monitors candidates via webcam, screen recording, and keystroke tracking, identifying suspicious activities such as multiple faces in the frame, unauthorized applications, or unusual eye movements. If any violation is detected, automated warnings are issued, and after multiple breaches, the test is automatically terminated. This proactive approach prevents cheating and ensures a level playing field for all test-takers.

Beyond security, the system also enhances administrative efficiency. Exam scheduling, user authentication, and result processing are fully automated, allowing educators and administrators to manage assessments effortlessly. The intuitive dashboard provides real-time insights into candidate performance, malpractice trends, and exam analytics, helping institutions make data-driven decisions. Furthermore, automated code evaluation tools ensure unbiased and efficient assessment of coding assignments, analysing factors like syntax, logic, and efficiency.

Additionally, "Code Tracker" introduces a fair and transparent earnings distribution system for instructors and educational institutions. By automating payments and distributing earnings based on participation, effort, and results, the system creates an equitable revenue model for educators conducting online assessments.

By combining AI-driven proctoring, real-time monitoring, and automated evaluation, "Code Tracker – Online Test Integrity System" establishes a secure, scalable, and efficient solution for modern online assessments. It empowers educational institutions, coding boot camps, and certification platforms to conduct fair, transparent, and high-quality exams, ultimately enhancing the learning experience for students while maintaining academic integrity.

II. RELATED STUDIES AND PREVIOUS RESEARCH

The demand for secure online examination platforms has increased with the rise of e-learning. Code Tracker addresses this need by integrating automated invigilation methods that leverage artificial intelligence. Several studies have explored the effectiveness of AI-driven proctoring tools and their impact on academic integrity.

- AI-Based Cheating Detection: Recent research highlights the importance of AI in monitoring student activities during exams. AI-powered models can analyse facial expressions, eye movements, and device usage to detect suspicious behaviour.
- Automated Warnings and Alerts: Implementing real-time alerts helps maintain exam discipline and reduce instances of misconduct. Automated warnings notify students of violations before taking disciplinary action.
- Data-Driven Exam Management: Analytics-driven systems improve assessment strategies by identifying patterns in student performance and behaviour.
- Scalability in Online Assessments: A well-structured proctoring system ensures that exams can be conducted at scale without compromising security.

III. METHODOLOGY

The Code Tracker system is designed to streamline online assessments by incorporating AI-driven monitoring, secure exam scheduling, and intelligent analytics. The following key aspects define its methodology:

- System Architecture: The architecture consists of a frontend built with React and JavaScript, a backend powered by Java and MySQL, and an AI-driven monitoring module.
- Real-Time Cheating Detection: Live camera feeds analyse student behaviour and detect anomalies such as multiple persons in the frame, frequent gaze shifts, and suspicious movements.
- Automated Exam Distribution: The system ensures students receive the correct exam papers at scheduled times, eliminating manual errors.
- Data Analytics and Reporting: Performance metrics and flagged activities are stored and analysed to provide educators with actionable insights.
- Scalability and Deployment: Code Tracker is deployed on cloud-based platforms with CI/CD integration, ensuring continuous updates and improvements.

IV. WORKING PRINCIPLE

Code Tracker operates through a combination of AI-powered monitoring and automated exam management. The system follows a structured workflow:

- Students log in using secure credentials and biometric authentication (if enabled).
- The system verifies identity and grants access to the exam.
- Real-time monitoring begins, analysing student behaviour using camera feeds and activity logs.

- If suspicious behaviour is detected, the system issues warnings and flags the event for review.
- Exams are automatically submitted if multiple violations occur.
- Educators receive detailed reports highlighting student performance, flagged incidents, and time-based analytics.

V. SYSTEM ARCHITECTURE

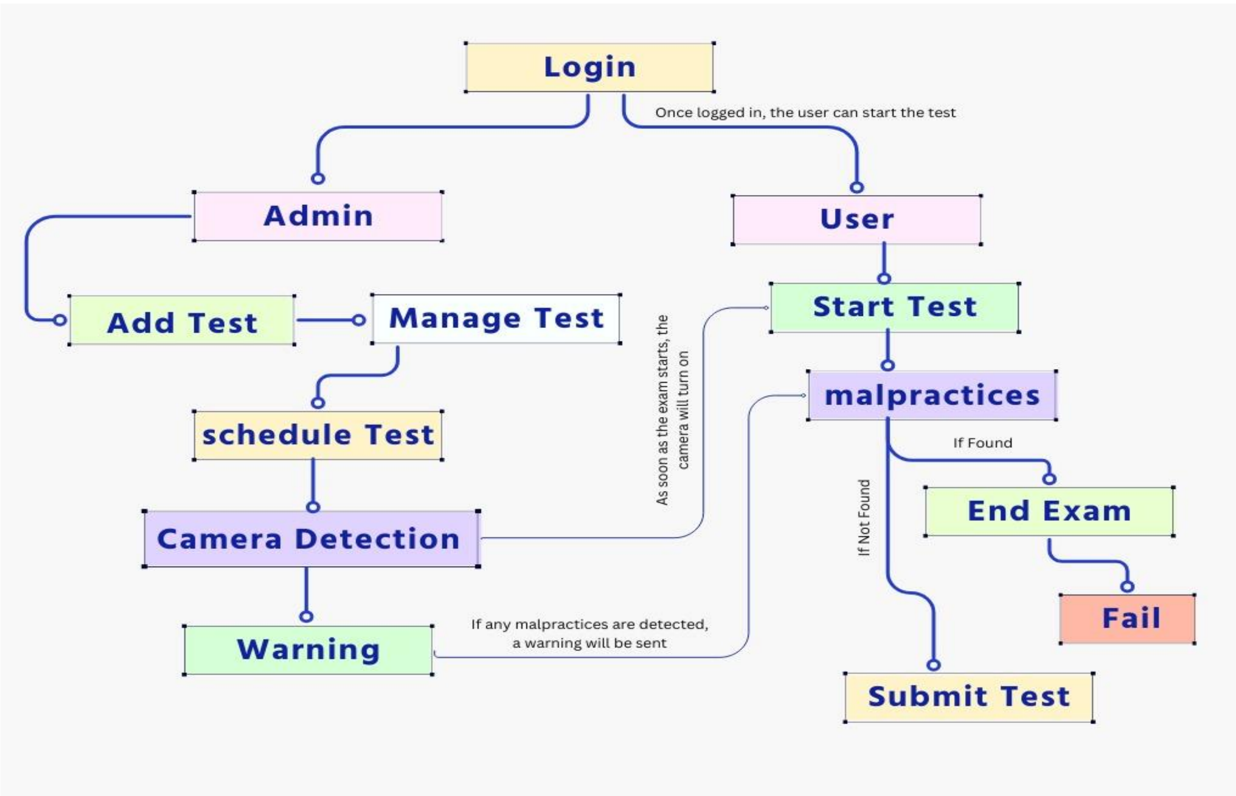
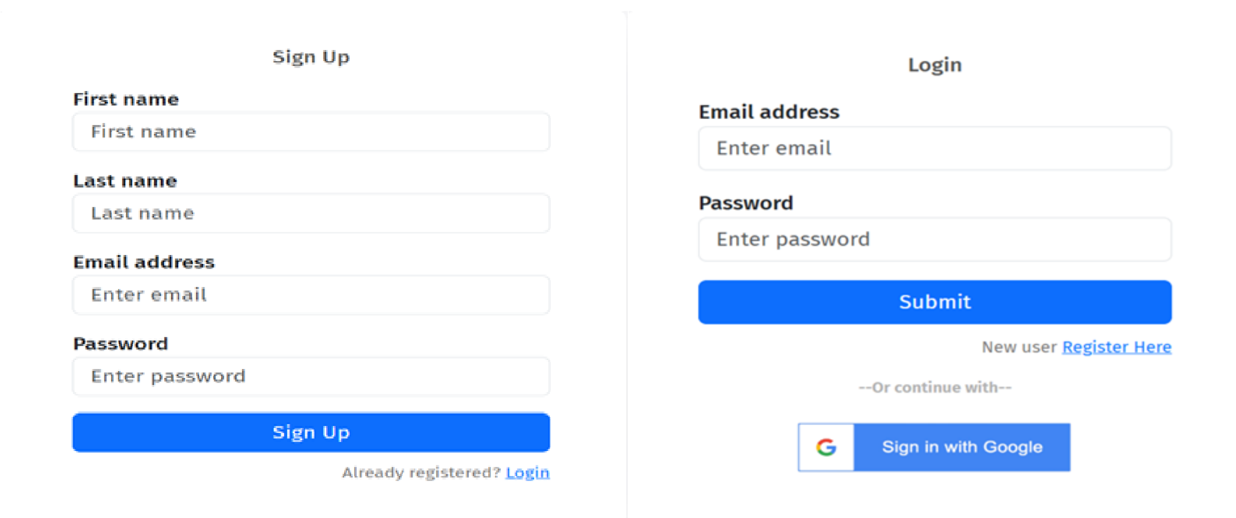
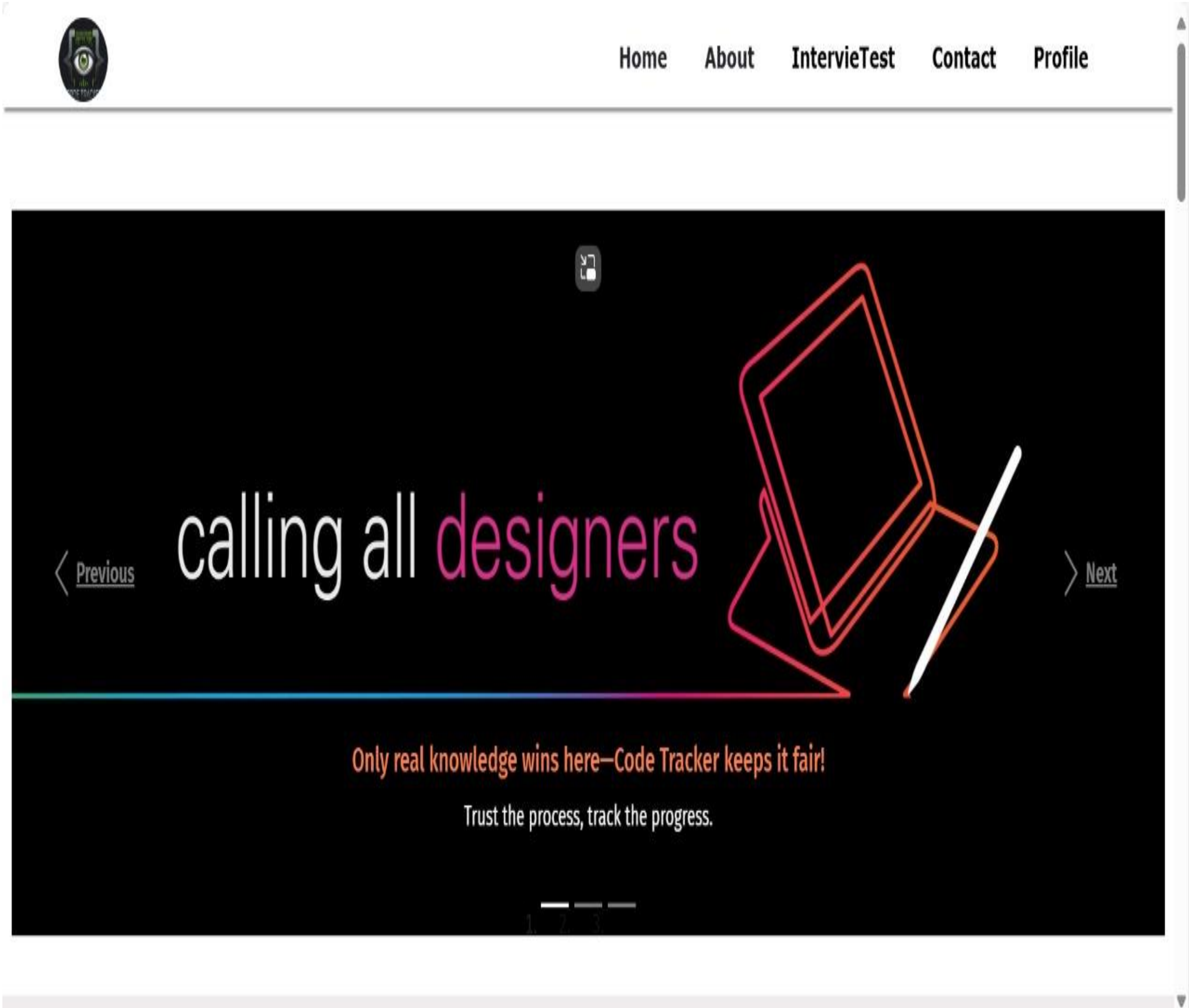


Fig 1. System Architecture

VI. EXPERIMENTAL RESULTS

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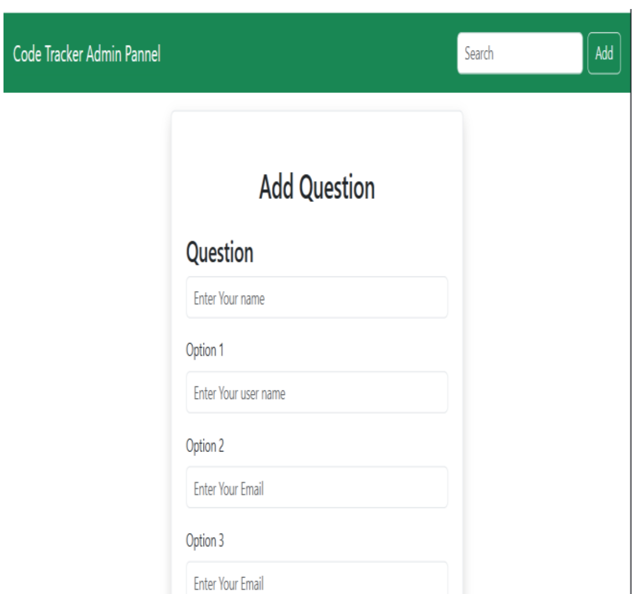
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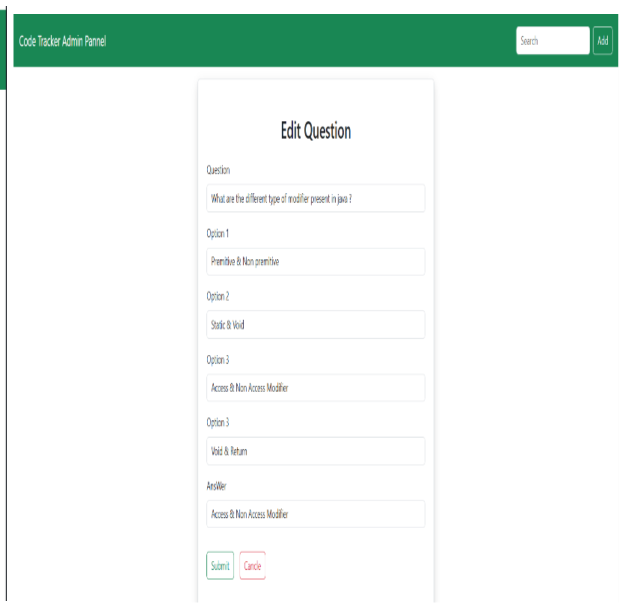
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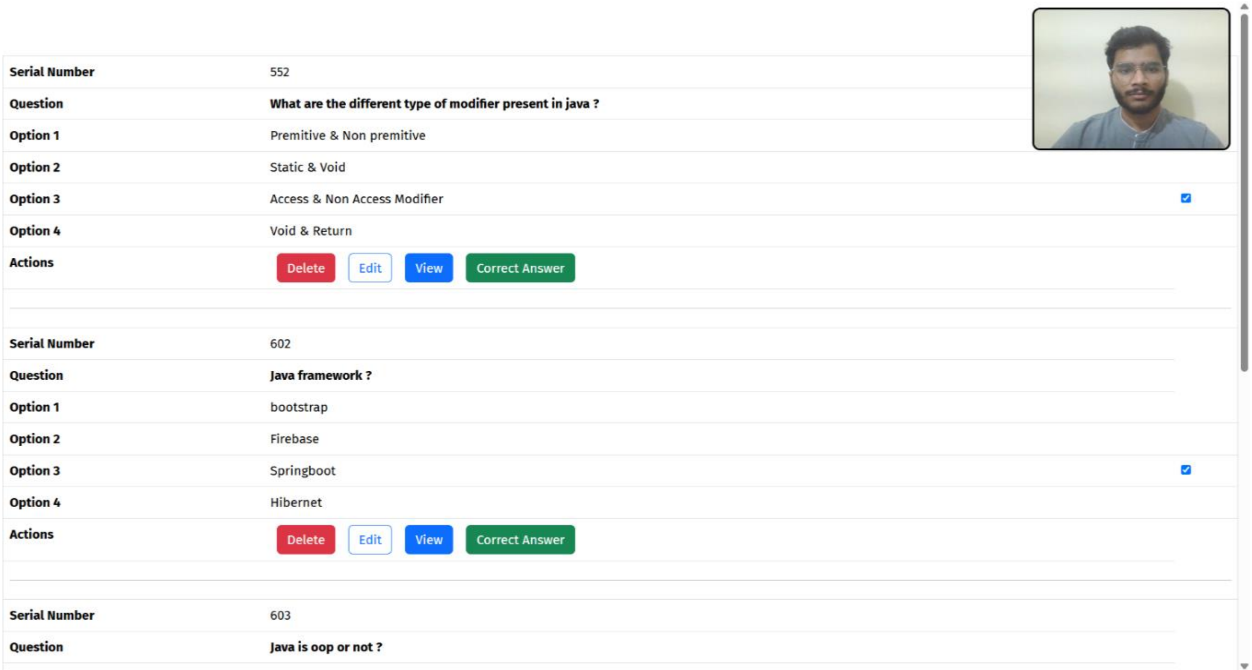

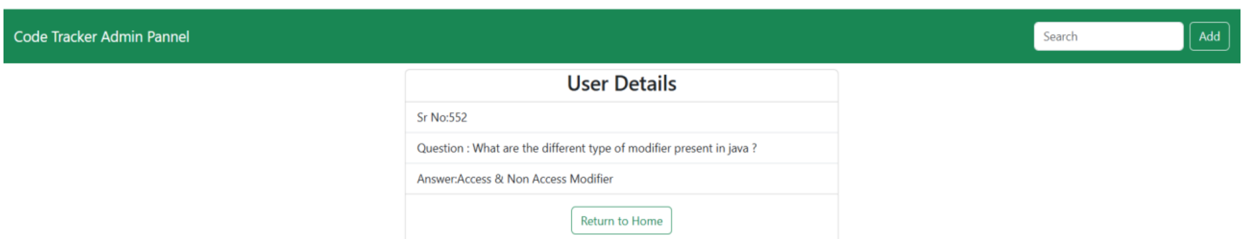

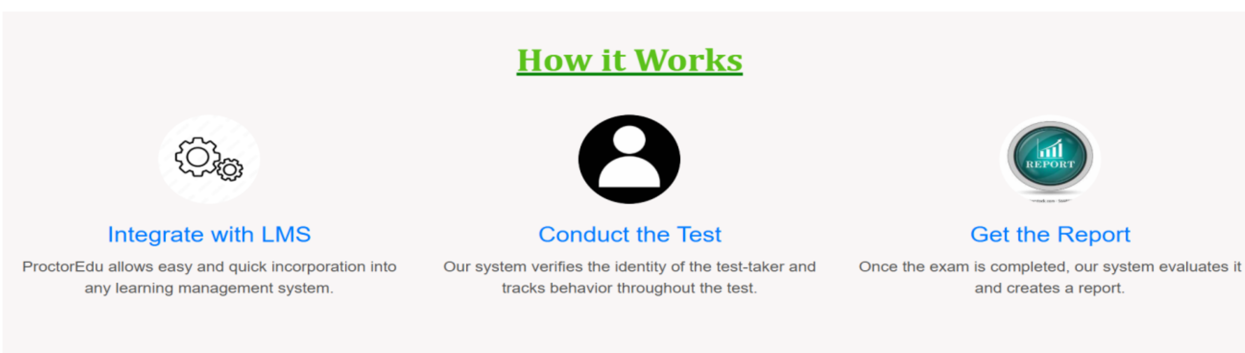

VII.CONCLUSION

The " Code Tracker – Online Test Integrity System " system successfully addresses major challenges in online test environments, providing a secure, scalable, and efficient solution for examination management. By leveraging modern web technologies and cloud computing, the system minimizes human intervention and ensures fairness in assessments. Future enhancements may include AI-based cheating detection, advanced analytics, and expanded support for different types of online assessments.

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