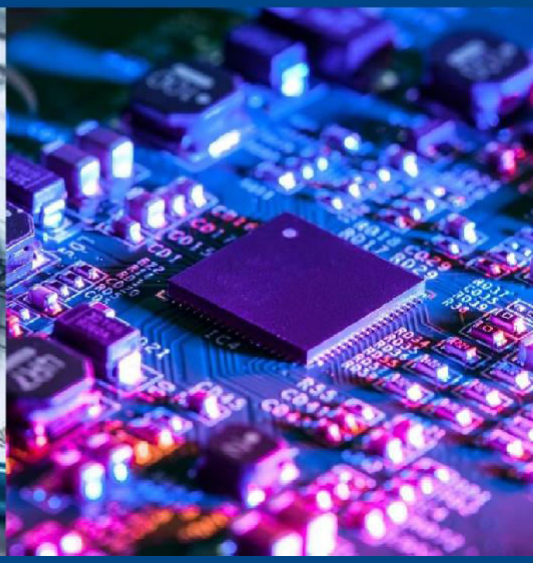
ISSN: 2582-7219





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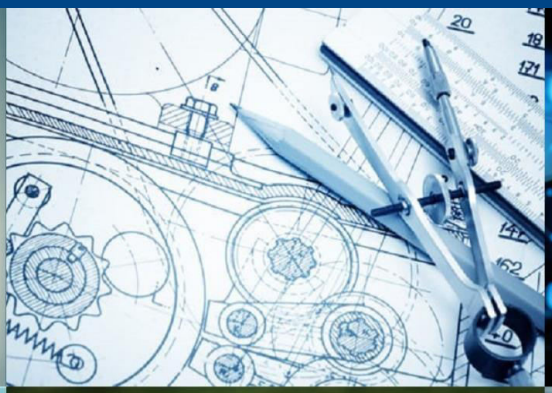

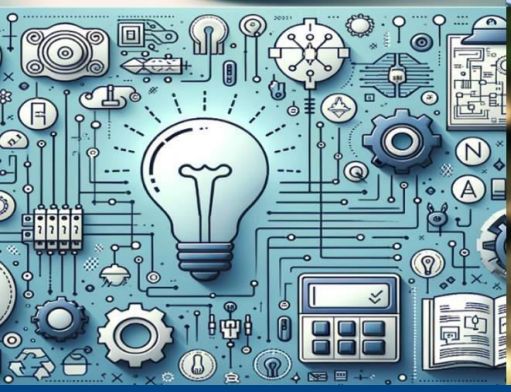

Impact Factor: 8.206

Volume 8, Issue 8, August 2025

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ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 8.206| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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ANTIFRAUDTEST: A PREDICTIVE MODEL FOR STUDENT CHEATING DETECTION USING BEHAVIOR ANALYTICS

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ABSTRACT: With the growing shift toward digital education, conducting secure online examinations has become a critical challenge. This paper proposes a smart, AI-enabled Online Examination System that not only verifies the identity of the candidate through facial recognition but also monitors the environment using object detection to prevent cheating. YOLOv8 is employed for real-time surveillance, detecting unauthorized objects like mobile phones, books, or additional people. The system integrates a user-friendly interface for registration, login, and conducting MCQ-based assessments, ensuring a reliable and secure exam-taking experience. This solution addresses a crucial gap in remote proctoring by automating both authentication and monitoring processes using state-of-the-art deep learning models. The project also considers scalability, usability, and user privacy, ensuring compliance with data protection standards while maintaining robust security.

KEYWORDS: Online Examination, YOLOv8, Face Recognition, Environment Monitor ing, Secure Assessment, AI Proctoring, Deep Learning, Remote Proctoring, E-Learning, Computer Vision.

I. INTRODUCTION

The evolution of e-learning platforms has led to an increased demand for reliable online assessment systems. Traditional exams require physical presence, but online assessments must ensure identity verification, environment surveillance, and secure test handling. The COVID-19 pandemic further accelerated the transition to remote learning, exposing the vulnerabilities of existing online exam platforms. Manual proctoring is inefficient, prone to errors, and lacks scalability. Furthermore, academic institutions are increasingly seeking cost-effective, autonomous solutions to mitigate cheating. Thus, an intelligent, automated solution is required. This paper introduces a solution integrating facial recognition and object detection using artificial intelligence to enhance the credibility and security of online exam detection and quick incident response in real time through video analytics.

II. LITERATURE SURVEY

Online examination systems have evolved significantly with advancements in web technologies, AI, and proctoring tools. Early systems focused on simple multiple-choice question delivery (Kumar et al., 2010) but lacked real-time monitoring and security. Later, cloud-based platforms (Al-Smadi & Goettl, 2011) introduced scalability y and remote accessibility. Research by Haris et al. (2017) emphasized secure authentication methods, including biometric verification, to prevent impersonation. AI-driven approaches, such as YOLO object detection and facial recognition (Redmon et al., 2016; King, 2009), have enabled automated environment checks to detect unauthorized persons or prohibited items. These innovations collectively improve exam integrity, accessibility, and efficiency, making modern systems more robust than traditional paper-based examinations.

EXISTING SYSTEM

Most current online exam platforms use simple login credentials or webcam proctoring. However, these are vulnerable to impersonation or cheating through unauthorized materials or people. Manual monitoring is time-consuming,

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inconsistent, and ineffective at scale. Commercial proctoring tools, such as ProctorU, Examity, or Honorlock, often raise concerns about user privacy and heavily depend on human reviewers.

PROPOSED SYSTEM

This research introduces a hybrid approach that combines: Facial Recognition: To verify the registered user using a pre-captured image and detect face mismatches in real-time. YOLOv8 Object Detection: To detect mobile phones, books, or the presence of multiple faces using advanced deep learning techniques. MCQ Interface: For seamless examination with automatic scoring and result generation. Security Feedback Loop: Alerts administrators in real-time if suspicious behaviour is detected, providing screenshots and logs for review. Offline Mode: Local data storage with the option to sync when connected, supporting exams in bandwidth-limited areas.

III. SYSTEM ARCHITECTURE

The system follows a modular design approach, where each major functionality is divided into self-contained modules. This improves maintainability, scalability, and reusability. Each module handles a specific task in the system, and together they work to provide a secure and efficient online examination experience.

The architecture consists of the following interconnected modules:

[1] User Interface Layer: Built using Tkinter for candidate registration, login, and exam interaction. Includes password visibility toggle and camera preview window.

[2] Authentication Layer: Captures and compares facial data using the Face Recognition library. Provides alerts for mismatch detection.

[3] Monitoring Layer: Uses YOLOv8 for detecting unauthorized objects/persons during the exam. Runs continuously in the background.

[4] Data Layer: Stores user credentials, scores, snapshots, and logs in CSV files or a lightweight SQLite database.

[5] Control Layer: Manages commun ication between the components, monitors the test duration, enforces cheating prevention rules, and logs all events.

This modular design supports easy extension and maintenance while ensuring component-level independence of applications.

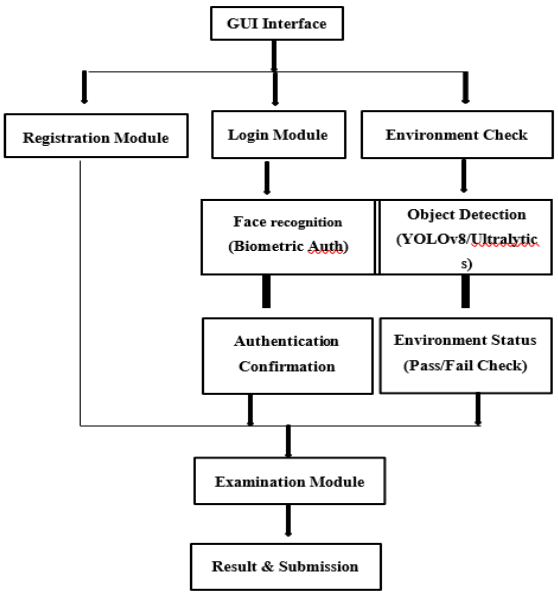

Fig 3.1 Modular diagram

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IV. METHODOLOGY

Face Capture & Registration: During user signup, a webcam captures the user's face, which is encoded and stored securely.

Login Verification: During login, the current face is matched with the stored encoding to prevent impersonation. A minimum confidence threshold is enforced to allow only accurate matches.

Environment Check (YOLOv8): Before the exam begins, and periodically during the test, YOLOv8 runs on webcam frames to detect phones, books, or additional persons. Each frame is analysed, and violations are logged.

MCQ Exam Flow: Users answer randomly ordered multiple-choice questions with a timer, question navigation, and submission confirmation. Questions and options are dynamically loaded from an external file.

Security Feedback: If violations occur, snapshots are saved, alerts are shown, and the test may be paused or terminated based on the configured rules. Repeated violations result in automatic disqualification.

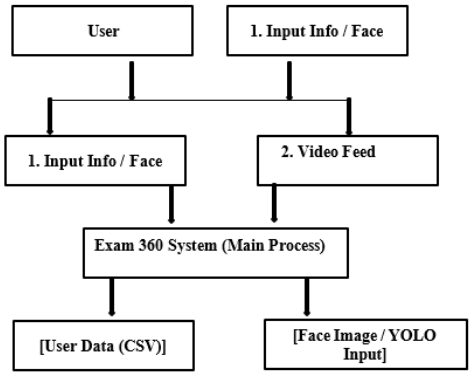

Fig 4.1 Methodology

V. DESIGN AND IMPLEMENTATION

The system is developed in Python and designed for cross-platform compatibility. Key design aspects include:
GUI Design: Using Tkinter with a navy-blue themed interface, all labels and input fields are stylized for readability and user experience.

Fast Webcam Initialization: OpenCV ensures quick loading, face rectangle overlay, and stable performance across different devices.

Face Recognition: Utilizes deep CNNs and dlib facial landmarks for robust identity matching under multiple lighting conditions.

YOLOv8 Integration: Lightweight YOLO v8s and YOLOv8n models are tested for real-time inference. The models are loaded via PyTorch Hub.

Data Handling: Uses CSV for prototyping and lightweight SQLite for long-term record keeping. Score analysis and violation logs are exported automatically.

Alert Mechanism: Pop-up messages and sound alerts notify users in case of detection.

A configuration file allows tuning of system parameters such as detection frequency, allowed devices, timeout duration, and match threshold.

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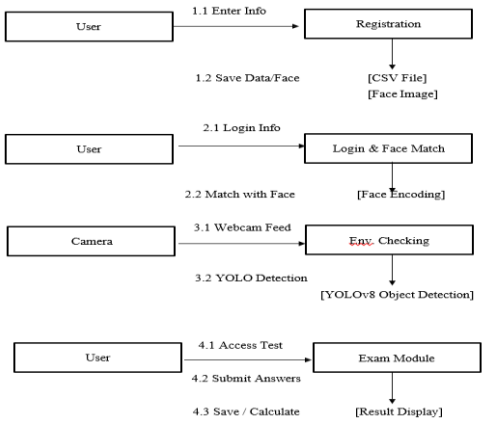

Fig 5.1 Sequential Diagram

VI. OUTCOME OF RESEARCH

Developed a reliable system that automates both authentication and environment monitoring without needing an active internet connection. Achieved high face recognition accuracy in various lighting and background conditions (above 94%) Implemented real-time detection of objects with high precision using YOLOv8 models. Enabled students to take exams in a fair, monitored environment without human proctors. Logs provide post-exam analysis and serve as a deterrent for malpractice. Admins can review flagged sessions, replay violation instances, and export reports.

VII. RESULT AND DISCUSSION

Testing was done on a group of 50 students under varying conditions:
[1] Face Recognition: 95% accuracy under normal lighting; 87% in low-light 99% with adequate webcam
[2] YOLOv8 Detection: 92% accuracy for phones/books; 94% for detecting extra faces.
[3] System Performance: Smooth on 4GB RAM systems; GPU speeds up object detection to <100ms/frame.
[4] User Feedback: 88% users found the system easy to use; 94% felt it improved fairness. The system balances performance, security, and usability, showing for real-world use in surveillance deployment.

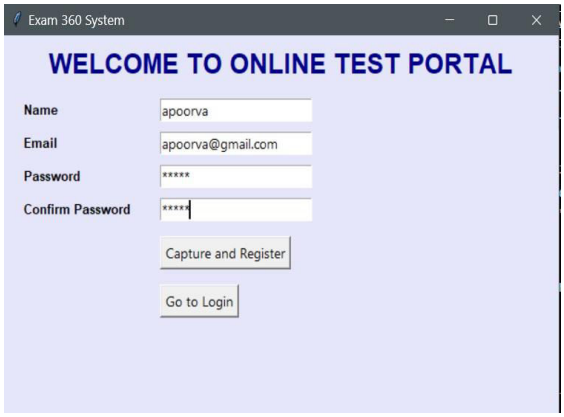

Fig 7.1 Registration page

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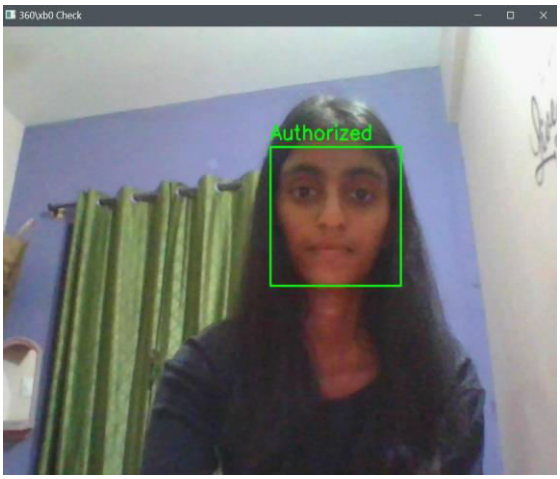

Fig 7.2 Check for authorized person

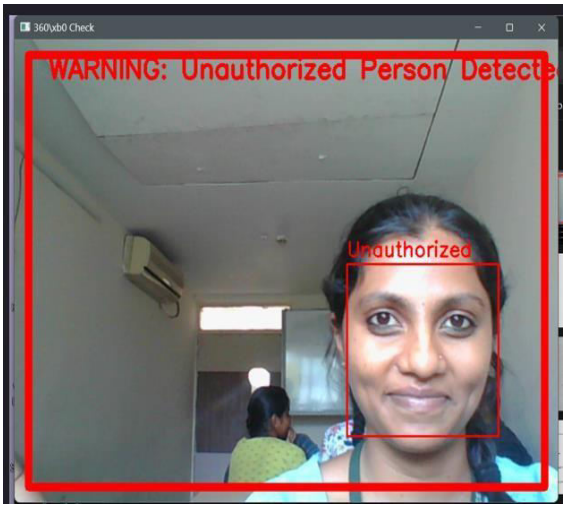

Fig 7.3 Unauthorized person

VIII. CONCLUSION

The AI-enabled Online Examination System developed in this research enhances exam integrity using face recognition and real-time environment monitoring. It overcomes many limitations of existing systems and promotes a secure digital assessment framework. The solution is scalable, cost-effective, and minimizes manual intervention. With continued development, including emotion detection, eye tracking, and cloud-based analytics, it can become a standard for e-learning institutions globally. Ethical considerations, such as data privacy and transparency, are also addressed by allowing full control of data access by users and administrators.

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