Final Year Project Showcase Batch 2021
Year 2025

Department: Department of Computer Science & Information Technology Programme: BS Computer Science	
1	***Project Title*** Design and Development of a Smart Proctoring System for Online Assessments.
2	***Project Idea*** The project aims to address the challenges of cheating and integrity in online examinations by developing an AI-powered proctoring system named CheatProof. This project aims to provide a comprehensive, scalable, and cost-effective solution that ensures academic integrity while enhancing the exam experience for both students and educators. CheatProof integrates advanced features such as **head-pose detection, gaze tracking, and object detection** enabling real-time identification of suspicious behavior. It also includes **browser locking mechanisms, IP restrictions and activity monitoring**, all contributing to a secure testing environment. Beyond proctoring, CheatProof supports the **entire exam lifecycle**, from test creation and question bank management to performance analytics and result generation, making it a one-stop platform for digital assessments. The system is designed to meet the needs of universities, professional certification bodies, and training organizations, particularly in regions where cost and accessibility are major concerns. By combining AI-driven monitoring with a user-friendly interface and strong backend infrastructure, The system empowers institutions to conduct credible, data-backed, and fair assessments in an increasingly digital academic world.
3	***Process*** **1. Methodology**: System was developed using the **Agile development methodology**, enabling rapid, flexible, and incremental progress. The project followed an iterative cycle involving continuous feedback, and adaptive planning. **2. Technologies Used:** **Frontend**: React JS, Tailwind CSS **Backend:** Node.js, Express.js, Flask (Python) **Database:** MySQL **3. AI Models:** **a. YOLO (You Only Look Once):** For real-time object detection to identify unauthorized devices or second persons during the exam. **b. OpenCV:** For implementing gaze tracking to monitor student eye movement and detect suspicious behavior. **c. MediaPipe:** For precise head-pose detection to ensure students are focused on their screens.

4. Key Steps:

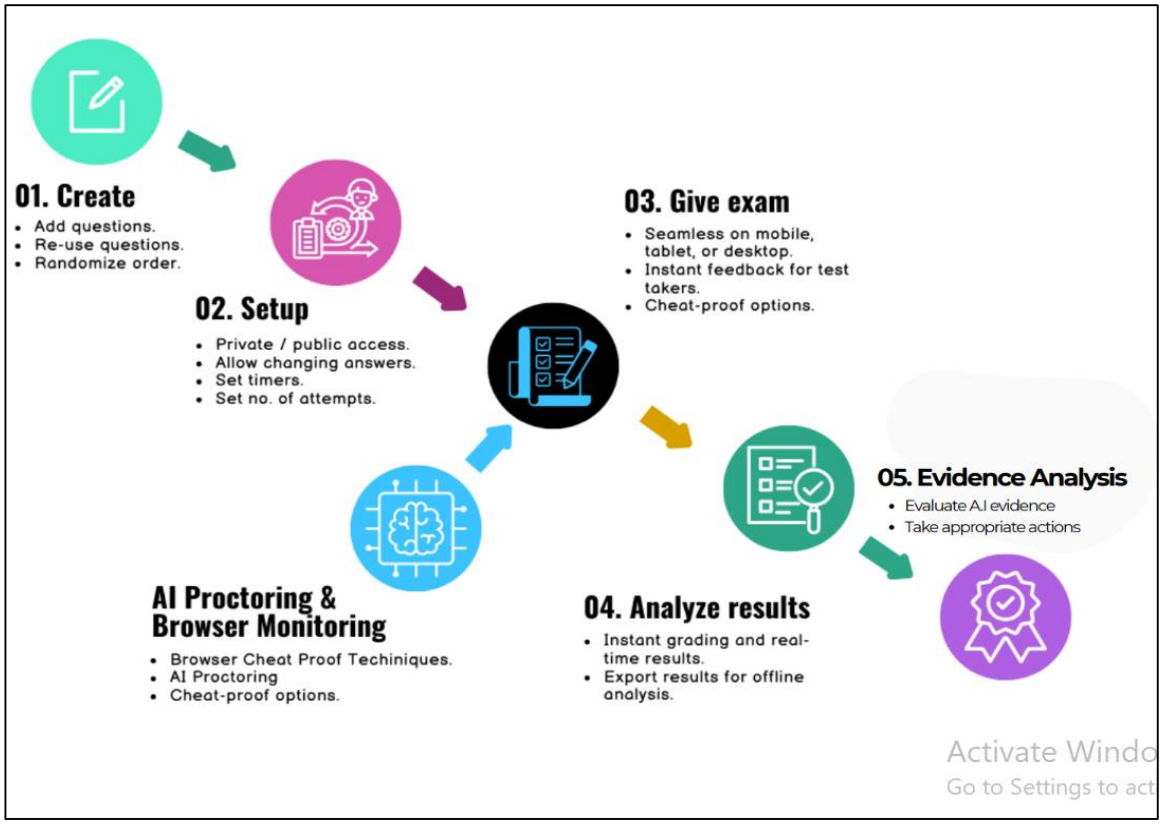
a. Requirement analysis: Detailed research was conducted to understand the shortcomings of current proctoring tools and the specific needs of educational institutions.

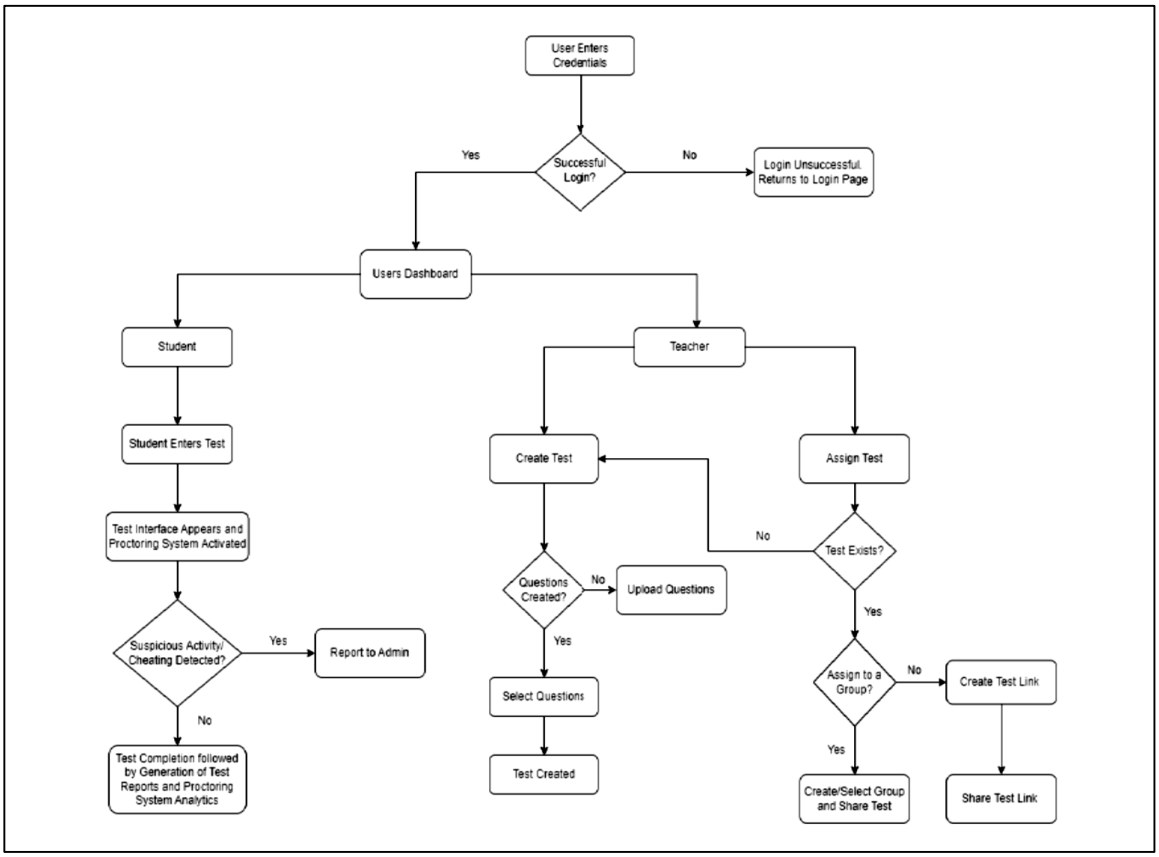
b. System Design: Architected a modular and scalable system capable of handling AI model integration, role-based dashboards, and secure exam management workflows.

c. Integration of AI Proctoring: Integrated computer vision models (YOLO, MediaPipe, OpenCV) for real-time monitoring. Flask was used to bridge Python-based AI tools with the JavaScript-based backend via APIs.

d. Rigorous testing including unit tests and integration tests were carried out in multiple testing phases.

e. Deployment: Deployed the platform on a cloud environment, ensuring secure access, scalability, and minimal latency. CI/CD pipelines were configured for faster rollouts and updates.



	5. System Flow Diagram: 
4	***Outcome*** A fully functional platform for creating, administering, and proctoring online exams. Successfully tested in real-world scenarios (e.g., live quizzes for 200+ concurrent users). Demonstrated 95% accuracy in detecting malpractice (e.g., phone usage, tab switching).
5	***Evidence*** (Theoretical Basis) The project builds on research in AI proctoring (e.g., gaze tracking, identity verification) and addresses gaps in existing tools like ProctorParhai and Classmarker. It combines secure exam management with advanced monitoring, as validated in peer-reviewed studies cited in the report (e.g., Malhotra et al., 2022).
6	***Impact on Sustainability of Urban Regions or SDG-11 "Sustainable Cities and Communities"*** The project contributes to Sustainable Development Goal (SDG) 11 by: 1. **Reducing Infrastructure Pressure**: Enables online assessments, reducing the need for physical exam centers, travel, and resource consumption in urban areas. 2. **Promoting Digital Inclusivity**: Provides equitable access to secure exams in underserved urban communities through low-bandwidth support and affordability.

	3. **Enhancing Urban Resilience**: Ensures continuity of education during crises (e.g., pandemics) through a remote-ready, always-available exam system. 4. **Lowering Environmental Impact**: Minimizes paper usage, transportation emissions, and energy consumption associated with traditional assessments. 5. **Empowering Smart Cities**: Integrates AI and cloud technologies to modernize urban education systems, aligning with smart city goals. 6. **Fostering Community Development**: Builds trust in digital education systems, enabling long-term sustainable learning practices in growing urban populations. **Contribution to Other Sustainable Development Goals** **SDG 4: Quality Education** The project supports **SDG 4** by: 1. **Ensuring Equitable Access** Delivers credible and secure online assessments to students regardless of location or socio-economic background. 2. **Maintaining Academic Integrity** Uses AI-powered proctoring features such as gaze tracking, head pose detection, and real-time monitoring to prevent cheating. 3. **Providing a Fair Assessment Environment** Offers a secure, accessible, and unbiased digital examination platform to ensure equal opportunities for all learners. **SDG 9: Industry, Innovation, and Infrastructure** The project supports **SDG 9** by: 1. **Providing Scalable Educational Infrastructure** Leverages modern technologies to deliver a robust, flexible, and cost-effective digital assessment system. 2. **Driving Innovation in Education** Incorporates AI, automation, and analytics to transform conventional exam processes into smart, data-driven systems. 3. **Enhancing Institutional Resilience** Supports educational institutions in adopting innovative, future-ready solutions that improve scalability, efficiency, and sustainability.
7	**Competitive Advantage or Unique Selling Proposition**
a	***Attainment of any SDG*** While CheatProof primarily supports **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation, and Infrastructure)**, it also contributes to **SDG 11 (Sustainable Cities and Communities)** by promoting equitable, tech-driven education in urban regions. • **SDG 4 (Quality Education):** Ensures fair and credible online assessments by preventing cheating through AI-powered proctoring (e.g., gaze tracking, object detection). Increases accessibility to remote education by providing a secure, scalable platform for institutions in underserved areas. • **SDG 9 (Industry, Innovation, and Infrastructure):** Introduces scalable, AI-driven infrastructure for online examinations, reducing reliance on manual invigilation. Promotes digital innovation in education systems and strengthens the resilience of institutions post-pandemic.

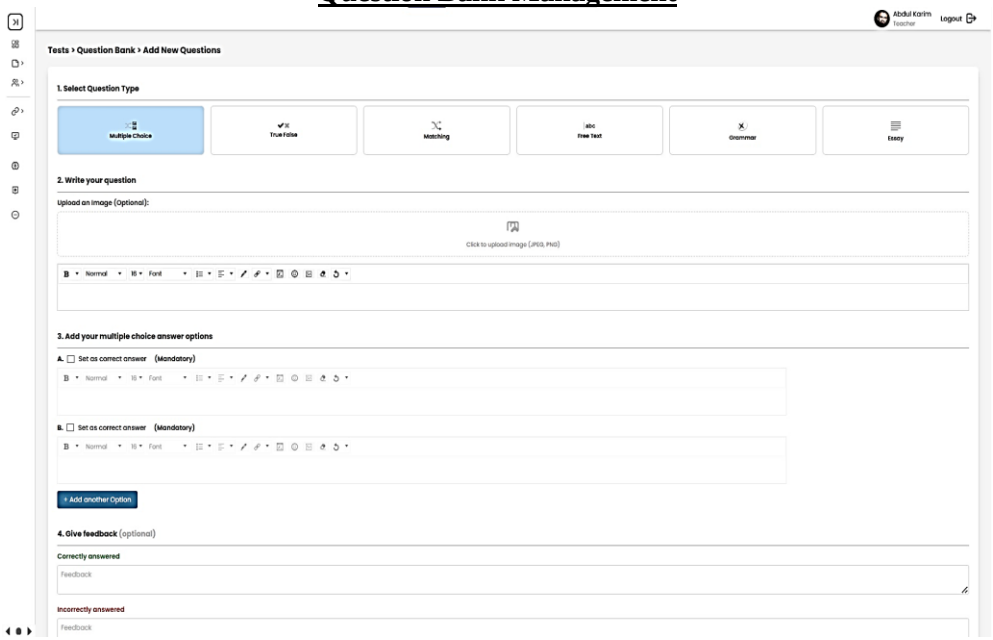
	• **SDG 11 (Sustainable Cities and Communities):** Supports digital transformation in urban education systems, reduces exam-related infrastructure pressure, and fosters inclusive, resilient communities through remote-ready assessment tools.
c	***Cost Reduction and Improved Efficiency compared to Existing Solutions*** CheatProof significantly lowers the cost of digital assessments by unifying all key features into one platform: • Significantly improves the entire online examination process by integrating test creation, AI-based proctoring, question bank and group's management, and result analytics into a **single unified platform**. • Unlike existing solutions that require multiple disconnected tools for assessment, monitoring, and reporting, CheatProof streamlines the workflow—reducing manual effort, operational costs, and administrative overhead. • By automating identity verification, behavior tracking during examination, and result generation, the system not only ensures **higher exam integrity** but also delivers **faster, more accurate evaluations**. • Project's end-to-end automation increases efficiency, enhances the overall user experience for students and educators, and offers institutions a **cost-effective alternative** to expensive live proctoring or multiple paid tools.
d	***Process Improvement*** **Current Issues in Proctoring:** • **High Costs**: Traditional proctoring requires human invigilators, increasing operational expenses. • **Scalability Limits**: Manual monitoring struggles with large-scale exams (e.g., 1,000+ test-takers). • **Human Error**: Fatigue and bias in human proctors lead to inconsistent malpractice detection. **Improvements by CheatProof:** • **AI Automation**: Replaces 90% of manual proctoring tasks, cutting costs by up to 60% for institutions. • **Real-Time Analytics**: Flags suspicious behavior (e.g., phone usage, tab switching) instantly, reducing post-exam review time. • **24/7 Availability**: Unlike human proctors, the system operates continuously without downtime.
e	***Expansion of Market Share*** The system aims on creating substantial opportunities to tap into **emerging educational markets** by addressing long-standing pain points in online assessment. **1. Solving Cost and Accessibility Barriers in Underserved Regions** Existing tools like ProctorParhai and Classmarker are often expensive and lack integrated exam management features. This project offers an affordable, all-in-one solution that removes reliance on expensive human proctoring or fragmented setups, making modern, secure online assessments accessible.

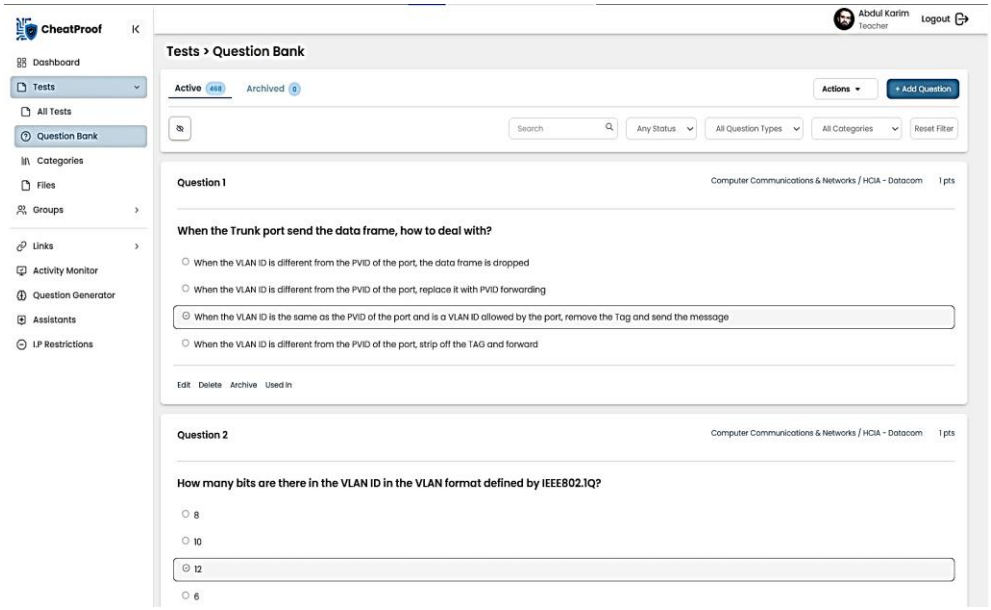
	2. Replacing Outdated Assessment Methods In many regions like South Asia, Africa, and Latin America, institutions still depend on unreliable methods like Zoom monitoring or basic browser lockdowns. CheatProof attempts to capture this market by offering a professional-grade system with AI proctoring, question management, and analytics, meeting modern standards at a fraction of the cost. **3. Targeting Educational Boards, Universities, and Governments** With its scalable infrastructure and built-in integrity mechanisms, this system can partner with educational boards and government agencies to standardize digital assessments across regions. **4. Enabling Institutions to Go Fully Online** By providing end-to-end exam lifecycle support, from creation to analysis, this project tries to empower smaller institutions to adopt fully digital exam systems without needing multiple tools or technical expertise. This ease of adoption accelerates market capture among schools, colleges, and training centers transitioning to digital.
f	***Capture New Market*** CheatProof targets underserved markets in developing regions by addressing key accessibility and affordability gaps: • **Affordable Pricing:** Subscription model at 1/3 the cost of competitors, making it ideal for low-resource institutions. • **Localized Support:** Optimized for low-bandwidth environments, ensuring reliability in remote and rural areas. • **All-in-One Solution:** Integrates proctoring, test creation, grading, and analytics—offering a complete, cost-effective alternative to fragmented tools.
8	***Target Market*** **Primary Users: Universities & Colleges** Serves higher education institutions conducting high-stakes exams such as university entrance tests, and online evaluations. With the growing shift toward hybrid and remote learning models, universities are increasingly seeking secure, scalable, and affordable solutions to uphold academic integrity amid rising online cheating cases. **Certification Bodies (e.g., ISO, Cisco)** Ensuring integrity in professional certification exams. AI-powered monitoring, identity authentication, and detailed analytics features ensure the credibility of online certification exams. 1. **Secondary Users: Corporate Training Programs** Employee skill assessments with anti-cheating measures. 2. K–12 Schools Use Case: Supports secure online assessments for school boards and K–12 institutions, especially in regions shifting to remote or hybrid learning models. **Geographic Focus** **Initial:** Initially focused on emerging education markets such as **Pakistan, India, and Nigeria**, where there is a growing need for cost-effective and secure digital examination solutions. **Long-term:** aims to partner with **global ed-tech companies** to offer its scalable exam management and proctoring system worldwide.
9	**Team Members** (Names along with email address)	1. Muhammad Jawwad – muhammadjawwad417@gmail.com 2. Abdul Rafay Chohan – abdulrafaychohan986@gmail.com 3. Muhammad Zaryab – zaryab.110786@gmail.com 4. Muhammad Rohan– rohanahmed5102@gmail.com

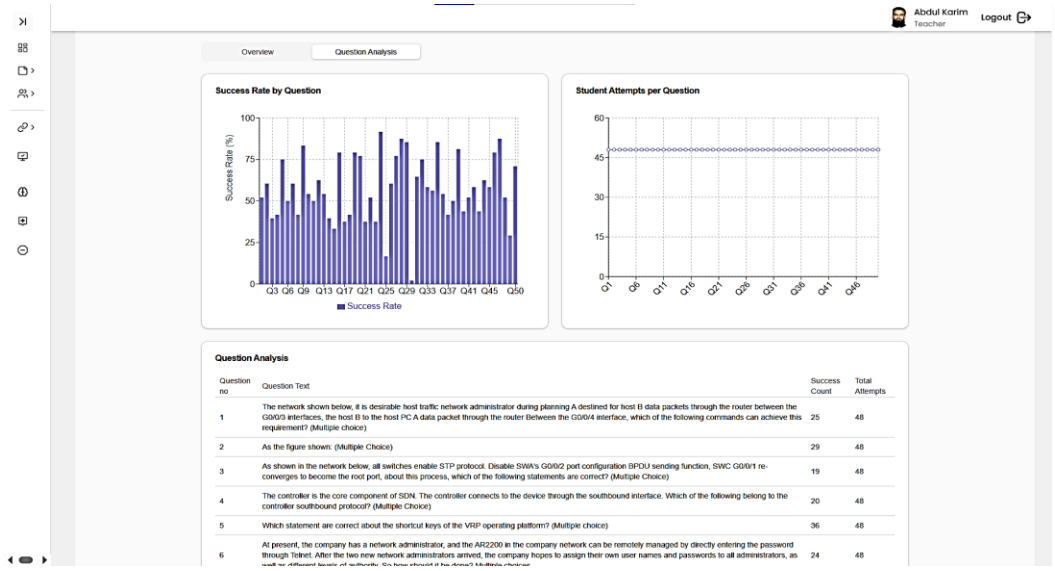
10	**Supervisor Name** (along with email address)	Dr. Abdul Karim Kazi – karimkazi@neduet.edu.pk (Assistant Professor, CS & IT)
11	**Video**	https://drive.google.com/drive/folders/1OLX4h6-6yh3Aa4AK-SGb__2Pr13bV46k?usp=sharing This video presents a full demonstration of the CheatProof system, showcasing all major features—from test creation and question management to AI-powered proctoring and result analytics. It offers a complete walkthrough of the platform's capabilities and user experience.

Pictures

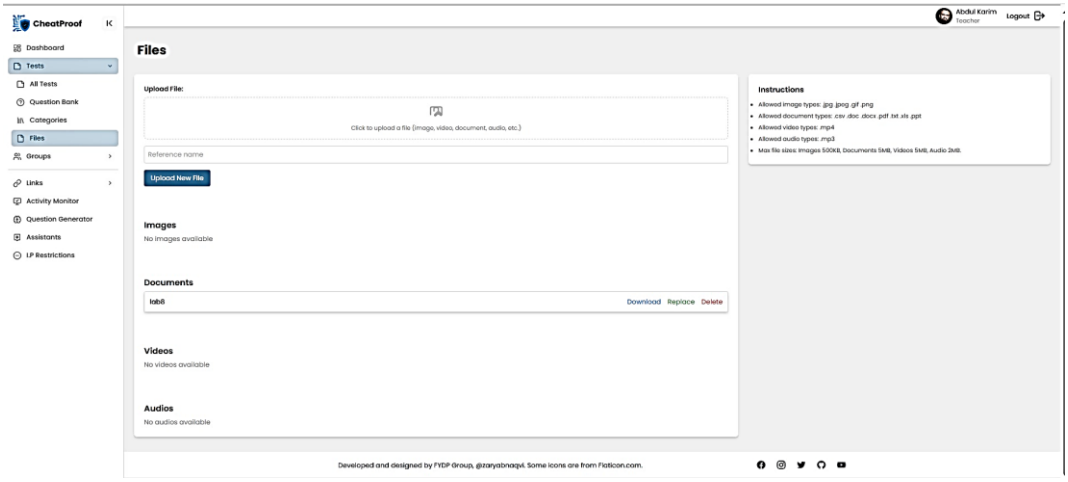
Question Bank Management



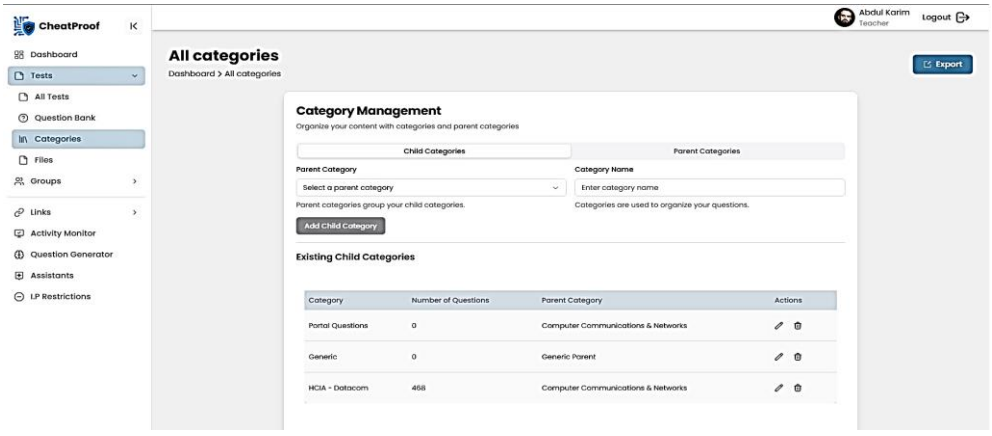




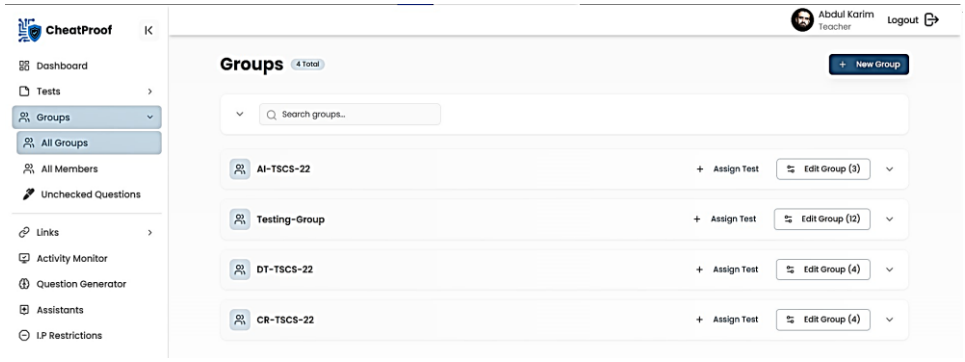
Teacher's Documents Repository

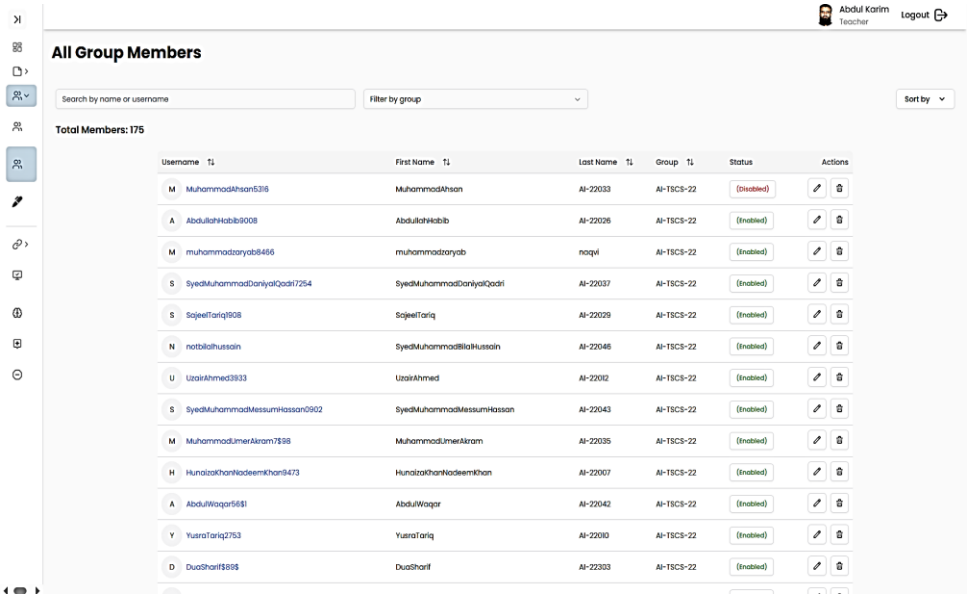


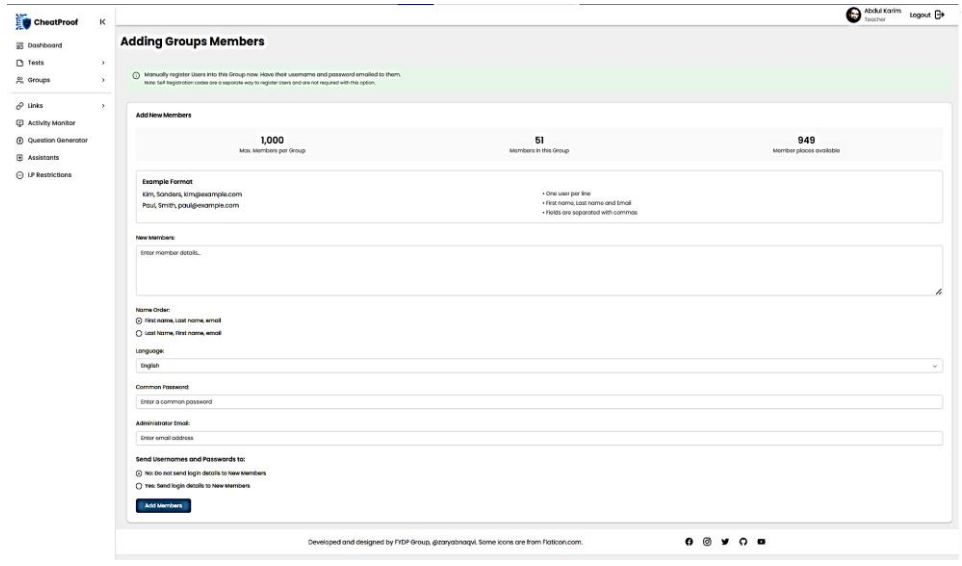
Categories Management

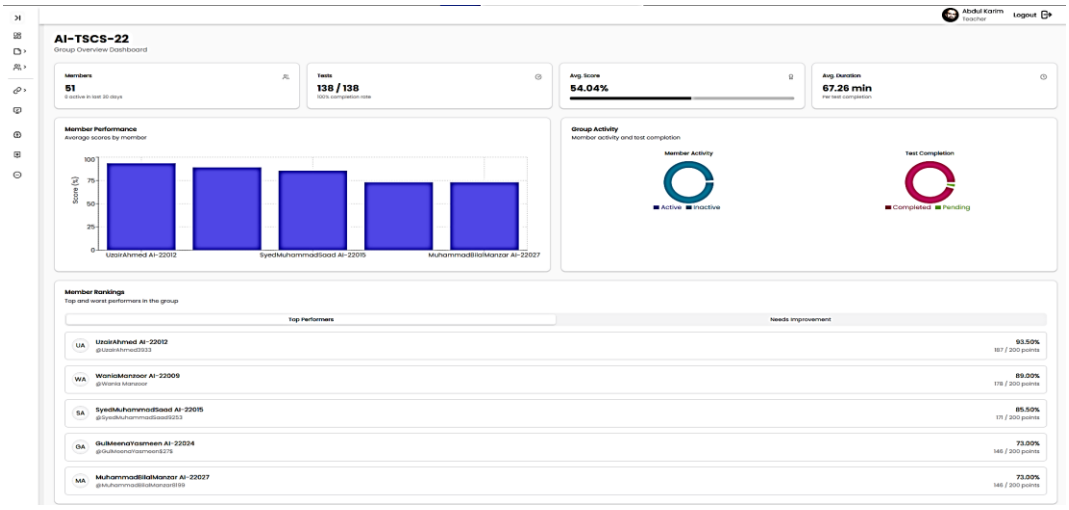


Group Management & Analytics

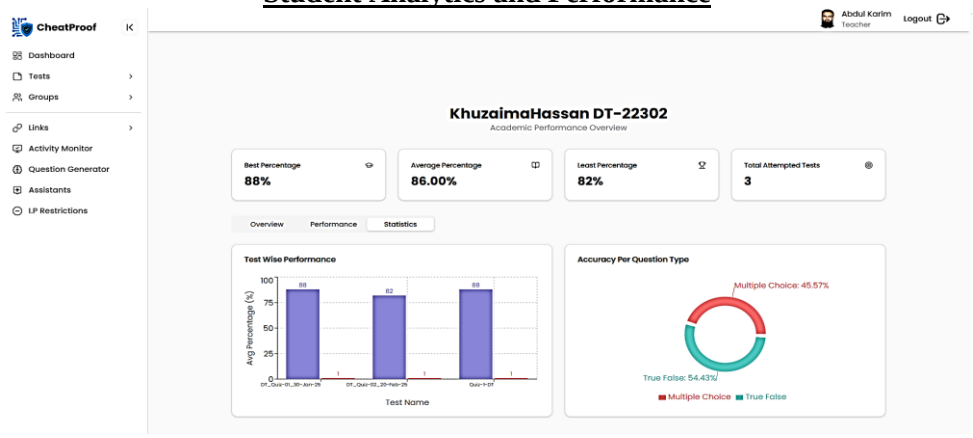




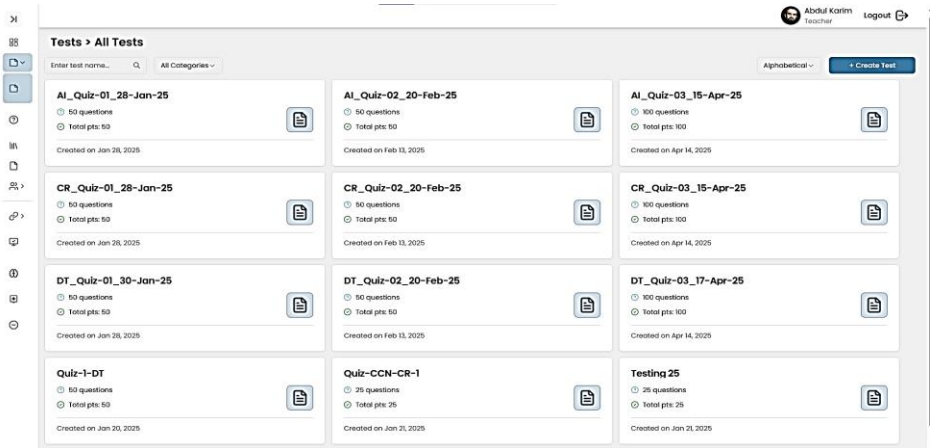


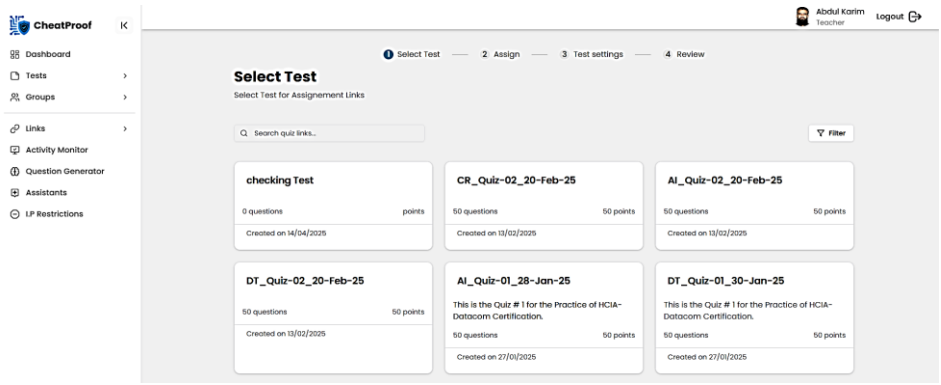


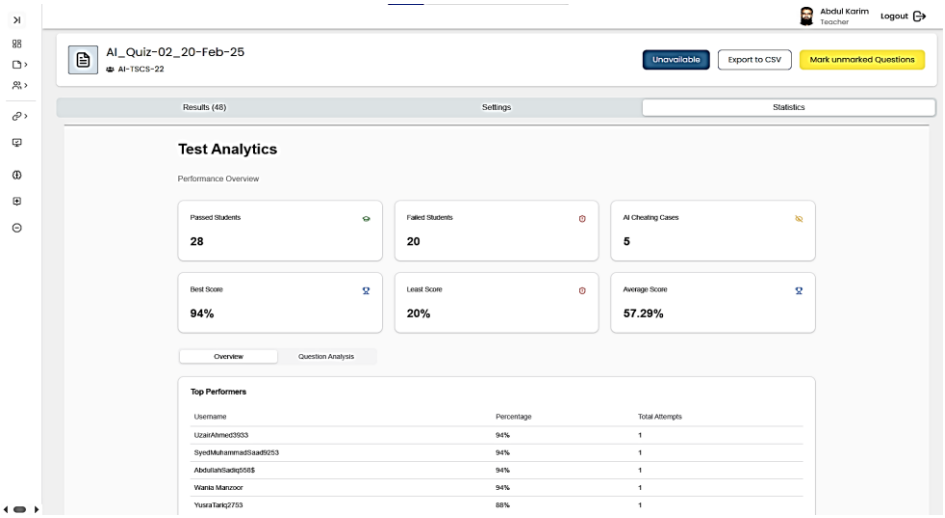
Student Analytics and Performance



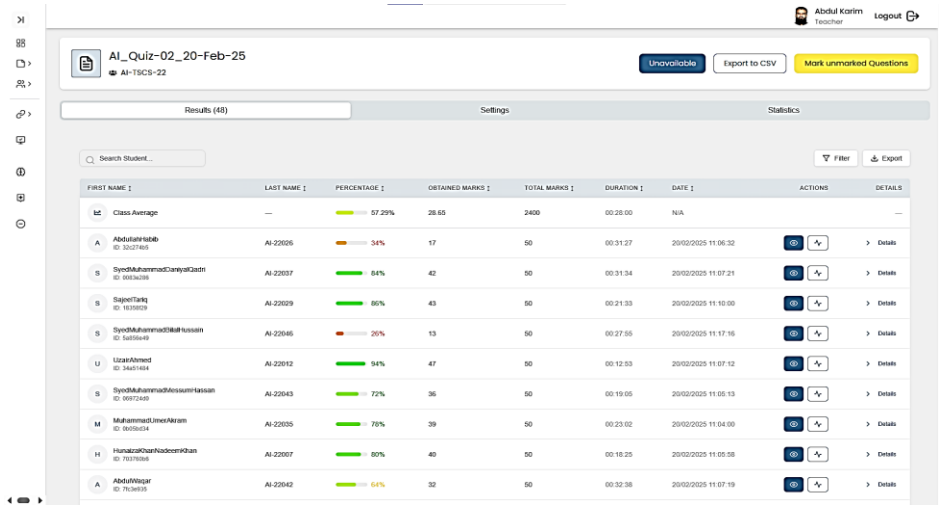
Test Management and Analytics



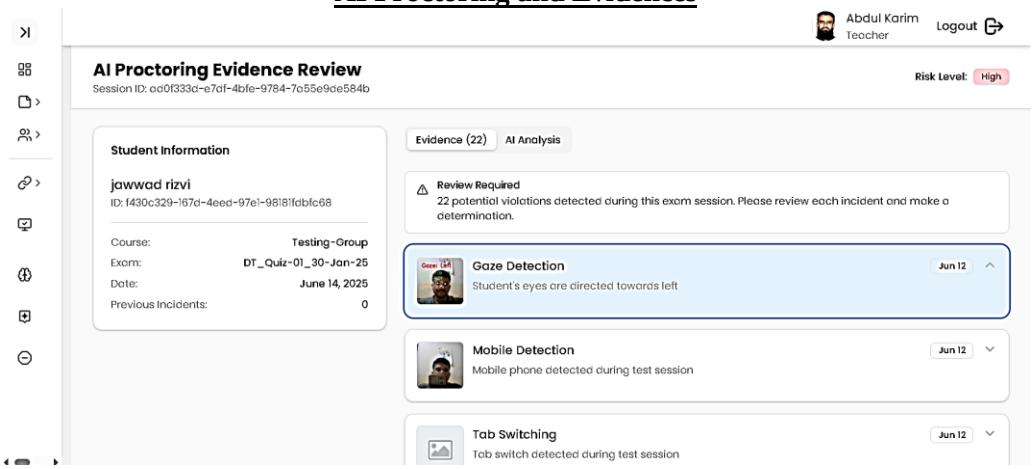


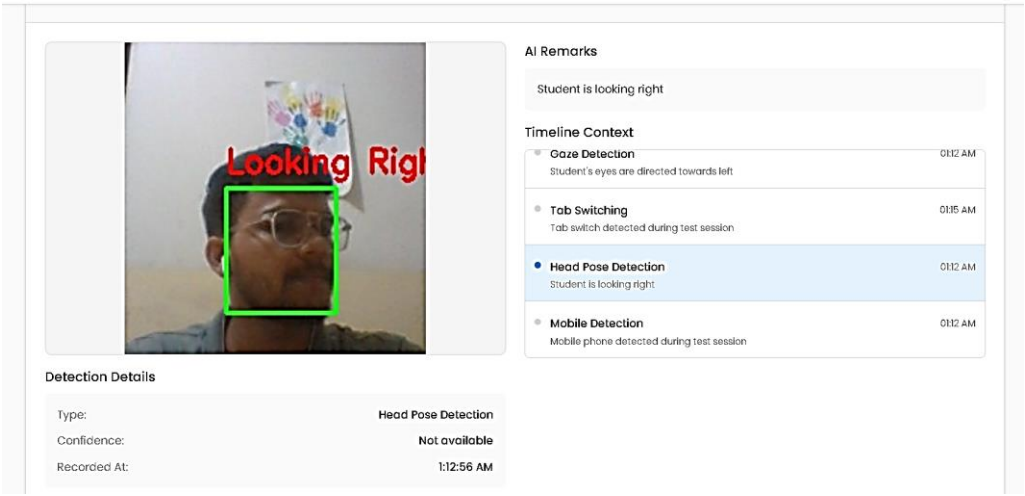


Test Results



AI Proctoring and Evidences





AI Analysis Summary
Generated on 6/14/2025

Investigative Summary

The evidence indicates potential academic dishonesty during the test session on 2025-06-11. Multiple instances of mobile phone detection (10 instances with 90% confidence), gaze deviations (4 instances), head pose anomalies (3 instances), and tab switching (5 instances with 100% confidence) were recorded. The data suggests a pattern of behavior inconsistent with a closed-book, solitary test environment.

The mobile phone detections, all with 90% confidence, raise a high level of concern and are supported by available media for review. The numerous tab switching events, although lacking media evidence, further strengthen the suspicion of unauthorized resource access. The gaze and head pose detections,