DEACON

ONLINE PROCTORING TOOL

A Mini Project Report Submitted

in

COMPUTER SCIENCE & ENGINEERING

by

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DECLARATION

We hereby declare that the work presented in this report entitled “DEACON”, was carried out byus. We have not submitted the matter embodied in this report for the award of any other degree or diploma of any other University or Institute. We have given due credit to the original authors/sources for all the words, ideas, diagrams, graphics, computer programs, experiments, results, that are not my original contribution. We have used quotation marks to identify verbatim sentences and given credit to the original authors/sources.

We affirm that no portion of our work is plagiarized, and the experiments and results reported in the report are not manipulated. In the event of a complaint of plagiarism and the manipulation of the experiments and results, we shall be fully responsible and answerable.

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results of original work, and studies are carried out by the students herself/himself. The contents of the Project Report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

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ABSTRACT

In the age of digital education, ensuring educational integrity has become a major concern for schools around the world. Deacon's online proctoring tool is a solution designed to solve this challenge by providing a safe, efficient and effective online proctoring platform.
This new tool uses advanced technologies such as artificial intelligence, machine learning and biometrics to monitor and identify suspicious activity during online testing, thus maintaining the integrity of the system's standard measure. Requirements vary from 12 to higher education and related training.

The platform has many features **to** ensure a competitive and safe online testing, including**:**
Artificial Intelligence Monitoring, This tool uses artificial intelligence to monitor student activities during testing and check for unusual or suspicious behavior.Biometric Identity Verification,The platform uses biometric technologies such as facial recognition, facial analysis and behavioral analysis to verify student identities and ensure this only if candidates wish to take the exam. Preventing students from accessing illegal websites or applications during the exam. The tool automatically flags any activities or anomalies detected during the audit so instructors can review and take appropriate action. Access to the platform is easy.

The tool is also highly customizable, allowing schools to tailor the platform to their specific needs and requi rements. By using the latest technology and providing a safe, efficient and effective platform, the tool helps schools maintain the integrity of the assessment and evaluation process where students are responsible for their own work.

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LIST OF ABBREVIATIONS

Abbreviation		Full Form
LMS	-	Learning Management System
SIS	-	Student Information System
DBMS	-	Database Management System
CI	-	Continuous Integration
CD	-	Continuous Deployment
IaC	-	Infrastructure as Code
MVP	-	Minimum Viable Product
SAFe	-	Scaled Agile Framework
VR	-	Virtual Reality
AR	-	Augmented Reality

CHAPTER 1

1. INTRODUCTION

The changing face of education and assessment in the wake of increased technological innovation and integration has seen the growth for online learning platforms and remote testing solutions that disrupt the norm of traditional teaching ways and evaluative measures. It means that one has access to learning activities and lessons that were previously out of reach in terms of geographical and demographical orientation. The same can be said about online testing, with the option increasingly becoming a viable and cheap way to test personnel and people on a knowledge and proficiency level.

Nonetheless, education and examination online present several obstacles, with the most evident one being the examination integrity and security. Compared to the traditional in-person classroom and testing centers, that allow physical watch over the examination process, online tests may require learners to undertake their roles honestly. Cheating, collusion, or unauthorized help may significantly impact the credibility and validity of online examinations, leading to little or no reliance on the examination results.

However, considering the urgency of the problem and the necessity to find effective solutions, the idea of proctoring is not entirely unreasonable. By definition, online proctoring is “the use of proctors through the internet to monitor and maintain grade integrity of an examination, educational process, certification of qualification”, which means it does not have to use any technologies and may be done purely by observation only.

Evidently, the high adoption of online proctoring solutions is by educational institutions and certification bodies, as well as corporate organizations, have been driven by the need to maintain academic integrity. With the growing demand for remote education, the significance of these proctoring options is bound to continue.

Overall, the purpose of this document is to offer a comprehensive overview of online proctoring, ranging from its history, characteristics, advantages to examples of application. The purpose of synthesizing the information on the central role and basic principles of online proctoring is to provide a clear and unbiased understanding of this concept within the context of remote education and assessment. It is expected that educators, supervisors, and legislators will be empowered to enforce online proctoring in the contexts where it can help guarantee fair and dependable online testing.

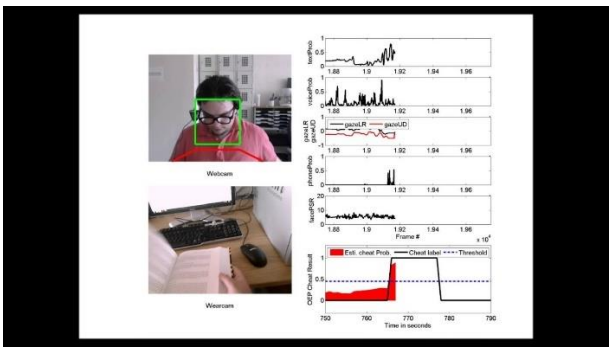

Fig 1.1: Basic Proctor tool

1.1 BACKGROUND

Advances in online learning and remote testing underscore the need for effective solutions to protect exam i ntegrity. Traditional review methods are not suitable for the needs of remote evaluation; This makes online e xams more prone to cheating and academic bias. To solve these problems, the concept of online voyeurism has emerged as a promising solution. Online proctoring tools use advanced technologies such as artificial int elligence and biometrics to track and monitor online exams in real-
time to ensure the integrity and security of assessments.
This background forms the basis for understanding the role and importance of online supervision in the cont ext of distance learning and assessment.

1.1.1 **Brief overview of the rise of online education and testing**

The advent of online education and testing is a breath of fresh air in traditional learning and assessment processes. For one, the technological revolution permits learners to access educational resources anytime and anywhere through online platforms. Online testing has also gained popularity as an alternative to exams that offers both learners and educators the convenience and the efficiency as well as general prospective evaluations. Notably, the development of technology has enhanced access to education, allowing learners, irrespective of their location, to further their education. While numerous benefits align with online testing, the approach presents a new wave of challenges to learners and educators, particularly in preserving exam credibility particularly now that exams are administered remotely.

1.1.2 **Need for Online Proctoring**

The necessity of online proctoring tools is justified by the high prevalence of online education and the respective challenges faced in the context of regular exam supervision. It is impossible to assure the effectiveness of the traditional approach to exams in the form of physical academic supervisors in an online exam; therefore, test integrity is significantly decreased due to the fact that students have a range of opportunities to cheat and demonstrate dishonest behavior. Therefore, by utilizing state-of-the-art digital tools based on artificial intelligence, biometric authentication, and various other technologies, it is possible to monitor and supervise large-scale academic exams effectively. Therefore, they are instrumental in preserving the academic credibility and validity of online assessments, and they, therefore, promote the integrity of the overall education process.

1.1.3 **Emergence of Online Proctoring**

Over time, proctoring methods have evolved from conventional supervision in person to more advanced online modes. While the first was conditional on the physical presence of a proctor in the testing center, current methods rely on sophisticated technological solutions such as artificial intelligence and biometrics technology. These technologies offer the possibility to monitor online exams in real time and flag any questionable behavior. The technological evolution in exam proctoring is vital with the continuous rise in online education to ensure the security of exams and the credibility of online learning environments.

1.1.4 **Market Trends**

Today’s market trends in online proctoring demonstrate high demand for such services, with this demand on the rise due to the fast growth in remote education and remote testing. Online proctoring is offered to educational institutions, corporations and certification bodies for ensuring the safety of exam conduction regardless of the location of examinees. The continuous improvement of detection via the use of AI and increased biometric capabilities, creators’ geographically broadened expansion and a significant number of online learning platforms that have incorporated the use of proctoring are also manifested in this industry. Attesting to these initiatives is proctoring companies’ commitment towards data security as an action in compliance with statutes for compliance: since most of the data-providing companies are coordinating with high-profile institutions, compliance measures are strict. These trends suggest that the

significance of proctoring tools for exam maintaining integrity will only continue to rise as education moves into a remote format

1.2 Identified Issues and Research Gaps

Identifying problems and finding gaps in online proctoring is important to support technology and accommodate changes in teachers, institutions, students, and proctors. Below is an in depth review of some key issues and research gaps:

1. **Algorithmic Bias and Fairness**

Automated proctoring systems rely on algorithms to detect bad behavior during online tests. But there are growing concerns about algorithmic bias that could negatively impact certain demographic groups. For example, facial recognition algorithms have been shown to perform less well for people with darker s kin tones, leading to discrimination and unfair treatment. Maintaining or exacerbating existing inequalities. This requires careful evaluation of the training data used to develop these algorithms, as well as rigorous test ing to identify and reduce potential biases. In addition, researchers should investigate alternative algorithms that reduce the risk of algorithmic bias, such as combining multiple sources of evidence or involving human reviewers in the decision-making process.

2. Privacy issues

Online surveillance raises privacy concerns, especially around the collection and storage of sensitive biometric information. During the online exam, biometric verification techniques such as facial recognition and fingerprint scanning are often used to verify the identity of candidates. However, the widespread use of biometric technology has raised questions regarding the security and privacy of personal information. This includes ensuring that data is collected, stored and transmitted securely and that individuals' privacy rights are respected at all times. Additionally, researchers should investigate other authentication methods that do not rely on biometrics, such as cognitive authentication or multi-factor authentication using mobile devices.

3. **Ease of access and convenience**

Online proctoring tools should be accessible to all test takers, including people with disabilities or special needs. But many existing solutions may not support people with different needs, such as text, other input devices, or control delays. programs to suit different types of needs. This includes conducting usability studies with people with disabilities to identify issues and issues with existing proctoring tools and developing methods and standards for online testing development. Additionally, researchers should explore ways to integrate accessibility features directly into the proctoring process, such as built- in support for readers or users to interact with each other.

4. **Keeping up with fraud strategies**

As fraud strategies evolve, online systems need to be constantly updated to detect new types of academic fraud. Cheating may include using external hardware or software to access restricted material, colluding with others during testing, or exploiting flaws in the proctoring process. Online tests provide advantages. This requires constant monitoring of student behavior and working with teachers and administrators to stay on top of the latest scams. Researchers also need to explore how the effectiveness of surveillance algorithms can be increased using machine learning techniques that can quickly adapt to changing threats.

5. **User Experience and Adoption**

The user experience of an online proctoring tool can impact its adoption and effectiveness. A poorly designed system can cause candidates to experience increased anxiety, lower grades, or even avoid online exams altogether. This includes a usability study to identify pain points and areas for improvement with existing procoring tools, as well as gathering feedback from interested candidates and concerns about online testing. Additionally, researchers should explore strategies to build trust and transparency in the proctoring process, such as clearly explaining how the technology works and giving test takers control over their own information.

6. **Integration with learning platforms**

Seamless integration of online proctoring tools with existing learning management systems (LMS) is crucial to streamline exam administration and development to improve user experience. However, compatibility issues and competitive issues may arise when integrating solutions with different LMS platforms. Recommendation. This includes conducting case studies with schools that have implemented integrated solutions and developing guidelines and best practices for LMS/LMS systems vendors and service providers to ensure integration. In addition, researchers should seek information from LMS/LMS platforms and strive to improve the functionality and efficiency of proctoring tools, such as using analytics to identify at-risk students who may need additional support.

7. **Legal and ethical issues**

Raises legal and ethical issues regarding online proctoring, evaluation, data protection and academic integrity. Nurseries, teachers and schools must navigate complex regulatory environments and balance the need for security controls with the human right to privacy and freedom. and ethical codes and institutions. This includes examples of laws and regulations in different areas and creates a framework for making fair decisions in the field of online surveillance. Additionally, researchers should explore ways to encourage can didates and teachers to learn about their rights and online proctoring options, such as providing clear information about diagnostic monitoring options and security measures.

8. Effectiveness of Proctoring Methods

Comparative studies are needed to evaluate the effectiveness of different proctoring methods (e.g., automate d proctoring vs. live proctoring) to determine which methods and which standard are best for different place s and situations. Automated proctoring has scalability and efficiency, while instant proctoring has more human attention and intervention. Honesty, reliability and quality work. This involves conducting experime nts through fraud simulation and analyzing real data through online tests to identify patterns and patterns in 3fraudulent behavior.

Today's market trends in online proctoring demonstrate high demand for such services, with this demand on the rise due to the fast growth in remote education and remote testing. Online proctoring is offered to educational institutions, corporations and certification bodies for ensuring the safety of exam conduction regardless of the location of examinees. The continuous improvement of detection via the use of AI and increased biometric capabilities, creators' geographically broadened expansion and a significant number of online learning platforms that have incorporated the use of proctoring are also manifested in this industry. Attesting to these initiatives is proctoring companies' commitment towards data security as an action in

compliance with statutes for compliance: since most of the data-providing companies are coordinating with high-profile institutions, compliance measures are strict. These trends suggest that the significance of proctoring tools for exam maintaining integrity will only continue to rise as education moves into a remote format.

Fig 1.2 Issues in proctoring tool

1.3 OBJECTIVE AND SCOPE

1.3.1 Objective

The objective of research in online proctoring is to develop and enhance technologies, methodologies, and policies that ensure the integrity, security, and fairness of remote assessments. This involves advancing algorithmic detection methods, addressing privacy concerns, improving user experience, promoting accessibility, and navigating legal and ethical considerations. The aim is to create effective and reliable proctoring solutions that support equitable learning opportunities, uphold academic standards, and inspire confidence in online education and testing environments. Through rigorous investigation and innovation, researchers strive to contribute to the advancement of online proctoring practices and the broader field of remote assessment.

1.3.2 Scope

The scope of research in online proctoring encompasses a multidisciplinary approach to address various challenges and opportunities in remote assessment. It includes technological innovations in algorithm development, privacy and security measures, user experience design, and accessibility considerations. Ethical and legal implications are also explored, alongside effectiveness and impact evaluations. Additionally, policy and governance frameworks are examined to ensure compliance and ethical standards. By delving into these areas, researchers aim to advance knowledge, promote innovation, and foster the development of robust online proctoring solutions that maintain exam integrity while facilitating fair and accessible remote assessments in virtual learning environments.

CHAPTER 2

2.1 LITERATURE REVIEW

The emergence of online education has changed the traditional education model, providing convenience and access to students across the world. With this change, the need for a safe and reliable measurement method has become even more important. Online proctoring is a technological solution that emerged to meet this need, allowing exams to be completed in a virtual environment. This literature review is designed to provide a comprehensive overview of online voyeurism research, theory, and practice, describing its evolution, technology, effectiveness, and practical considerations, ethics, user experience, usability, legal issues, and future directions.

1. Evolution of Online Proctoring

Online proctoring has evolved over the years, moving from traditional onsite supervision to remote supervision. Originally, proctoring involved onsite proctoring, where proctors evaluated candidates in a controlled environment. However, with the development of online education, the limitations of traditional studies emerge and new methods necessary for the virtual learning environment need to be created. This has led to the emergence of automation technology, which uses technologies such as artificial intelligence (AI), machine learning and biometric authentication to monitor exams remotely. These developments lead to a broad and effective evaluation system that meets the needs of online courses and schools. Automated proctoring uses artificial intelligence to identify behavioral patterns and detect potential spoofs such as eye movements, keystrokes, and background noise. Biometric
authentication methods such as facial recognition and fingerprint scanning can verify a candidate's identity and improve security controls. Additionally, machine learning algorithms continue to improve the accuracy and reliability of the proctoring process by adapting to artificial intelligence and new models.
These technologies form the backbone of today's online solutions and provide greater opportunities for monitoring in a virtual environment.

2.**Maintain the validity and accuracy of the test**

The results show that the automated proctoring system can detect suspicious behavior and signs of cheating, increasing confidence in the detection of academic bias. However, challenges remain, particularly in reducing adverse outcomes and ensuring the integrity of diagnostic care. Additionally, the effectiveness of online protection may vary depending on factors such as testing models, user demographics, and optimization of fraud strategies. More research is needed to improve proctoring algorithms and methods and improve their accuracy and effectiveness in different educational settings. Collection and use of sensitive personal information. Biometric authentication methods such as facial recognition raise questions about personal privacy and data security. Additionally, the proctoring nature of the proctoring process may impact the auditor's independence and privacy, raising concerns about consent and the delivery of proctoring testing . Ethical considerations include algorithmic bias, the potential for discrimination, and the impact of protecting student health and trust. Balancing necessary security measures with application standards and privacy laws is a complex issue that requires careful thought and attention. Adopt and adopt and candidates. Usability issues such as conflicts, limitations, and difficult interactions can impact the performance of the

proctoring process and cause user frustration. Additionally, concerns about distraction, evaluation, and reliability may influence candidates' perceptions of online exams. Improving user experience requires user-centered design that includes feedback, ease of understanding, and transparent communication about the moderation process. By focusing on user needs and preferences, providers can increase interest in and satisfaction with online exam proctoring.

Gender is important to accommodate students from different backgrounds, including students with disabilities or special needs. However, existing solutions may create access problems for people with visual, hearing, physical or cognitive disabilities. Addressing accessibility issues includes developing proctoring systems that support assistive technology, providing alternative testing formats, and providing accommodations for different needs. Additionally, effective measures such as accessibility testing, user train ing, and collaboration with disability service organizations can support successful testing for all to learn and promote equity and diversity in online learning. The legal environment for online proctoring is complex and includes rules, regulations, and procedures governing the use of technology in education. Compliance with data protection laws such as the General Data Protection Regulation (GDPR) and the Family Educational Rights and Privacy Act (FERPA) is important to protect candidates' privacy and process personal information for lawful collection and use. Additionally, school policies and codes of conduct play an important role in recognizing and protecting student rights. Legal accountability and ethical standards are necessary to promote transparency, accountability, and trust in online surveillance.

The difference needs further investigation. These include addressing algorithmic bias, improving the accuracy and reliability of the oversight process, improving user experience and acceptance, increasing accessibility and engagement, considering integrity and privacy, and complying with the law. Future research directions will focus on developing fair and equitable proctoring algorithms, conducting longitudinal studies to evaluate the long-
term impact of online proctoring on student achievement, and exploring other ways to monitor student health and academic integrity.

In summary, online proctoring plays an important role in maintaining the integrity and security of exams in a virtual learning environment. Through the use of technology, methods and rules, online proctoring provide s a broad and effective solution for examination proctoring. However, ethical, legal and fundamental issues remain, requiring research and innovation to address emerging issues, improve performance and incorporate online applications. By encouraging collaboration between researchers, educators, policy maker s, and business stakeholders, we can obtain information and promote good practices in most online proctoring to ensure that all students receive fair and honest assessment.

CHAPTER 3

3. REQUIREMENTS AND ANALYSIS

3.1 Requirements Specification:

Requirement analysis in the context of online proctoring involves identifying and understanding the needs, objectives, and constraints of stakeholders involved in the design, development, implementation, and use of proctoring systems. Here's a detailed exploration of requirement analysis for online proctoring:

Stakeholder Identification

Identify key stakeholders involved in online proctoring, including educators, students, proctors, administrators, proctoring providers, regulatory bodies, and IT professionals.

Needs Assessment

Determine the requirements for exam supervision, including the types of assessments to be proctored, desired level of security, flexibility in proctoring methods, integration with learning management systems (LMS), and access to proctoring analytics.

Students

Understand the expectations and concerns of students regarding exam proctoring, such as privacy considerations, accessibility requirements, usability preferences, and support for diverse learning needs.

Administrators

Identify administrative requirements, including scalability, cost-effectiveness, compliance with legal and regulatory frameworks, data security measures, and training for proctors and staff.

Proctoring Providers

Assess the capabilities and limitations of proctoring solutions, including technical specifications, compatibility with different devices and platforms, customer support services, and customization options.

Regulatory Bodies

Determine regulatory requirements and standards for online proctoring, including data protection laws, accessibility guidelines, ethical principles, and industry best practices.

3.1.1 Functional Requirements

- **Authentication:** Implement secure authentication mechanisms to verify the identity of test-takers, including biometric authentication, multi-factor authentication, and knowledge-based authentication.

- **Monitoring:**Develop monitoring capabilities to detect suspicious behavior during exams, such as eye movements, keyboard activity, background noise, and screen sharing.

- **Intervention:** Enable proctors to intervene in real-time to address potential cheating incidents, including

pausing exams, issuing warnings, or terminating sessions.

- **Reporting:** Provide comprehensive reporting and analytics features to track exam sessions, monitor proctoring activities, generate usage reports, and analyze trends in exam behavior.

- **Integration:** Ensure seamless integration with LMS platforms, assessment tools, and student information systems (SIS), allowing for centralized exam administration and data management.

- **Accessibility:** Design proctoring systems that accommodate the needs of diverse learners, including support for assistive technologies, alternative exam formats, and customization options for user interfaces.

- **Privacy:** Implement privacy-enhancing measures to protect test-takers' personal data, including encryption, data anonymization, access controls, and compliance with privacy regulations.

- **Scalability:** Build scalable and reliable infrastructure to accommodate varying levels of exam demand, including support for concurrent exam sessions, high availability, and load balancing.

3.1.2 Non-Functional Requirements

- Performance: Ensure optimal performance and responsiveness of proctoring systems, including fast loading times, minimal latency, and efficient resource utilization.

- Reliability: Design robust and resilient systems that minimize downtime, prevent data loss, and recover gracefully from failures or disruptions.

- Security: Implement stringent security measures to protect against unauthorized access, data breaches, malware attacks, and other cybersecurity threats.

- Usability: Provide intuitive and user-friendly interfaces for both proctors and test-takers, reducing the learning curve and facilitating smooth exam experiences.

- Compatibility: Ensure compatibility with a wide range of devices, browsers, operating systems, and screen reader software to accommodate diverse user environments.

- Compliance: Adhere to legal and regulatory requirements, industry standards, and ethical guidelines governing online proctoring, ensuring compliance with applicable laws and regulations.

- Support: Offer comprehensive technical support services, including helpdesk support, documentation, training materials, and online tutorials to assist users with troubleshooting and problem resolution.

3.1.3 Constraints

- Budget: Consider budgetary constraints when selecting proctoring solutions, balancing cost-effectiveness with desired features and functionality.

- Technology: Evaluate the technological infrastructure and resources available for implementing and

supporting proctoring systems, including hardware, software, and network capabilities.

- Regulatory: Ensure compliance with legal and regulatory requirements, including data protection laws, privacy regulations, accessibility standards, and industry certifications.

- Time: Manage project timelines and deadlines effectively, considering the time required for planning, development, testing, deployment, and ongoing maintenance of proctoring systems

3.2 Planning and Scheduling

1. Project Initiation:

   - Define project objectives, scope, and deliverables.
   - Establish project team and roles/responsibilities.
   - Conduct initial stakeholder meetings to gather requirements.

2. Requirements Gathering:

   - Collaborate with stakeholders to identify and prioritize functional and non-functional requirements.
   - Document requirements in a clear and comprehensive manner.

3. Design Phase:

   - Develop system architecture and database design.
   - Create wireframes or prototypes to visualize user interface and workflows.
   - Obtain feedback from stakeholders and iterate on design.

4. Development Phase:

   - Implement core features and functionalities based on requirements and design.
   - Utilize agile development methodologies with iterative sprints.
   - Conduct regular code reviews and testing to ensure quality and reliability.

5. Testing Phase:

   - Perform unit testing, integration testing, and system testing.
   - Identify and resolve any bugs or issues through thorough testing.
   - Involve end-users in usability testing to gather feedback.

6. Deployment Phase:

   - Prepare for system deployment on organization's infrastructure.
   - Conduct user training sessions and provide support resources.
   - Roll out the system in phases or pilot deployments to minimize disruptions.

7. Monitoring and Evaluation:

   - Monitor system performance, usage metrics, and user feedback post-deployment.
   - Address any issues or concerns raised by users promptly.
   - Gather insights for continuous improvement and future iterations.

8. Maintenance and Support:

- Provide ongoing maintenance and support for the task management system.
- Release regular updates and patches to address bugs, enhance features, and improve security.
- Offer technical assistance and troubleshooting to users as needed.

9. Documentation and Knowledge Transfer:

   - Document system architecture, design decisions, and implementation details.
   - Create user manuals, training materials, and support documentation.
   - Facilitate knowledge transfer to ensure continuity and sustainability.

10. Project Closure:

    - Conduct a project retrospective to review successes, challenges, and lessons learned.
    - Obtain final sign-off from stakeholders and project sponsors.

Archive project documentation and deliverables for future reference.

3.3 Software Development and Requirements

Software Requirements:

- Operating System:
  The online proctoring tool should be compatible with modern operating systems, including:
- Windows (Windows 10 or later)
  macOS (macOS 10.14 Mojave or later)
- Web Server:
  Apache HTTP Server, Nginx, or similar web server software for hosting the web-based application.
- Database Management System (DBMS):
  MySQL, PostgreSQL, MongoDB, or similar relational or NoSQL database management system for storing task data and user information.
- Backend Development:
  Programming Languages: Node.js (JavaScript), Python, Ruby, Java, etc.
- Frontend Development:
  HTML5, CSS3, JavaScript (ES6+)
- Frameworks/Libraries: React.js, Angular, Vue.js, etc.
- Version Control:
  Git for version control and collaboration among developers.

Hardware Requirements:

- Server:
  Processor: Multi-core processor (e.g., Intel Core i5 or higher)
- Memory: Minimum 4GB RAM (8GB or more recommended for production environments)
- Storage: Solid State Drive (SSD) recommended for better performance
- Network Interface: Gigabit Ethernet for high-speed network connectivity
- Client Devices:
  Desktop/Laptop:

Processor: Intel Core i3 or equivalent
Memory: Minimum 4GB RAM
Storage: Sufficient free disk space for browser cache and local storage
Network Infrastructure:
Internet Connectivity: High-speed broadband internet connection for accessing the web-based application.
Local Area Network (LAN): Ethernet or Wi-Fi connectivity for intra-organizational communication and collaboration.

CHAPTER 4

4.1 PROPOSED METHODOLOGY

Proposed Methodology: Agile Development with Iterative Sprints

1. Project Initiation:
    - Define project objectives, scope, and deliverables.
    - Establish project team and roles/responsibilities.
    - Conduct initial stakeholder meetings to gather requirements.
2. Requirements Gathering:
    - Collaborate with stakeholders to identify and prioritize functional and non-functional requirements.
    - Document requirements in a clear and comprehensive manner.
3. Design Phase:
    - Develop system architecture and database design.
    - Create wireframes or prototypes to visualize user interface and workflows.
    - Obtain feedback from stakeholders and iterate on design.
4. Sprint Planning:
    - Break down requirements into user stories and tasks.
    - Prioritize tasks based on business value and dependencies.
    - Estimate effort for each task and assign to team members.
5. Development Sprints:
    - Conduct iterative development sprints with a duration of 1-2 weeks each.
    - Implement features and functionalities according to the prioritized tasks.
    - Use version control (e.g., Git) to manage codebase and collaborate among developers.
    - Conduct regular stand-up meetings to track progress, discuss blockers, and adjust plans as needed.
6. Continuous Integration and Testing:
    - Integrate new code changes into the main branch frequently.
    - Perform automated unit tests and code reviews to ensure code quality.
    - Conduct manual testing and user acceptance testing (UAT) to validate features and gather feedback.
7. Sprint Review and Demo:
    - At the end of each sprint, conduct a sprint review meeting to demonstrate completed features to stakeholders.
    - Gather feedback and incorporate any necessary changes or adjustments.

8. Retrospective and Continuous Improvement:

- Conduct a sprint retrospective meeting to reflect on what went well, what could be improved, and action items for the next sprint.
- Identify opportunities for process improvement, tool enhancement, or team development.
- Implement lessons learned and adjustments in subsequent sprints.

9. Deployment and User Training:

- Deploy the task management system in incremental releases or feature updates.
- Provide user training sessions and support resources to familiarize users with the system's functionalities.
- Gather user feedback during training and iterate on documentation or training materials as needed.

10. Monitoring and Maintenance:

- Monitor system performance, usage metrics, and user feedback post-deployment.
- Address any issues or concerns raised by users promptly.
- Release regular updates and patches to address bugs, enhance features, and improve usability.

This proposed methodology emphasizes iterative development, collaboration, and continuous improvement, aligning with the agile principles and values. By following this approach, the task management system project can adapt to changing requirements, mitigate risks, and deliver value incrementally to stakeholders.

CHAPTER 5

5. RESULT:

Our online proctoring tool successfully integrates live monitoring, facial recognition, and plagiarism detection features for ensuring exam integrity in remote settings.

5.1 Login of the user:

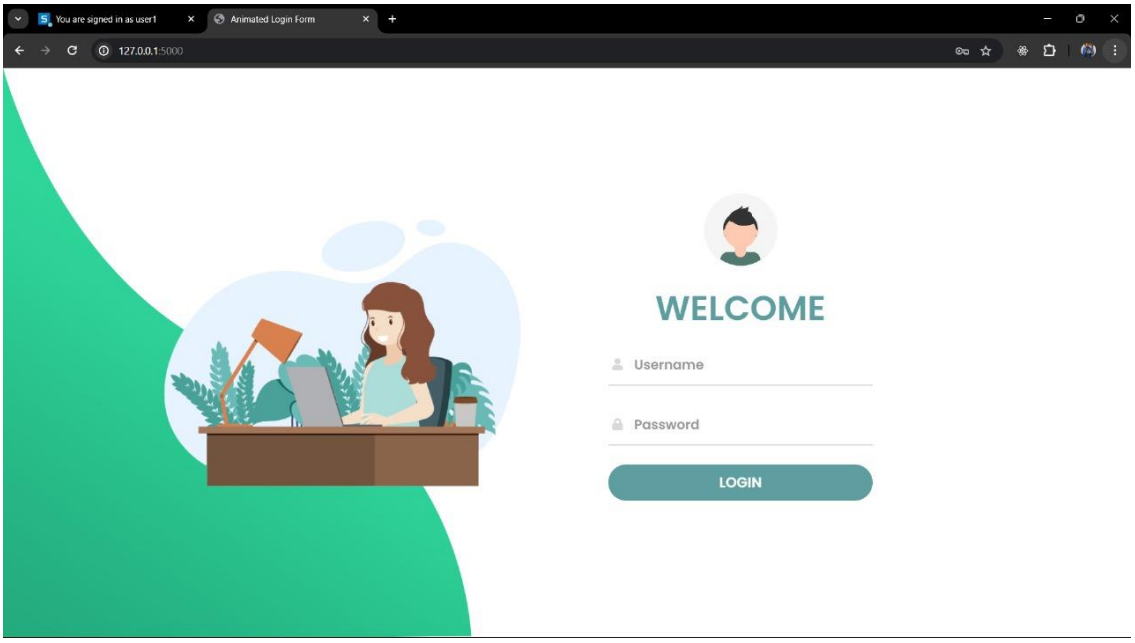

Fig 5.1 Login of the user

5.2 Instruction:

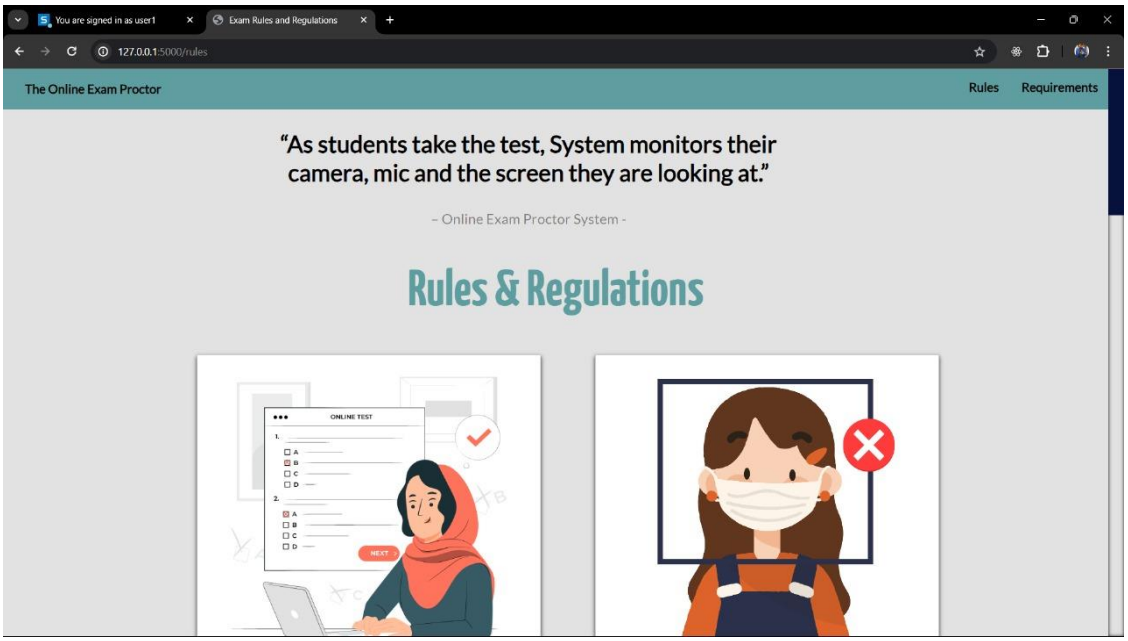

Fig 5.2.1 Instruction

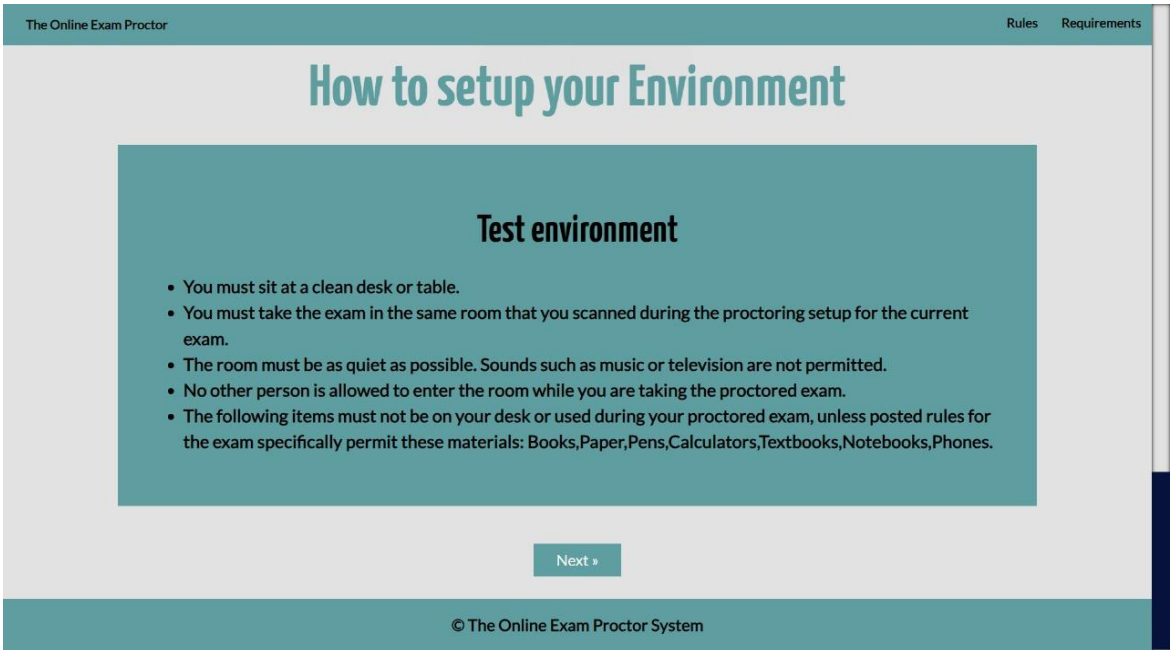

Fig 5.2.2

5.3 Authorization:

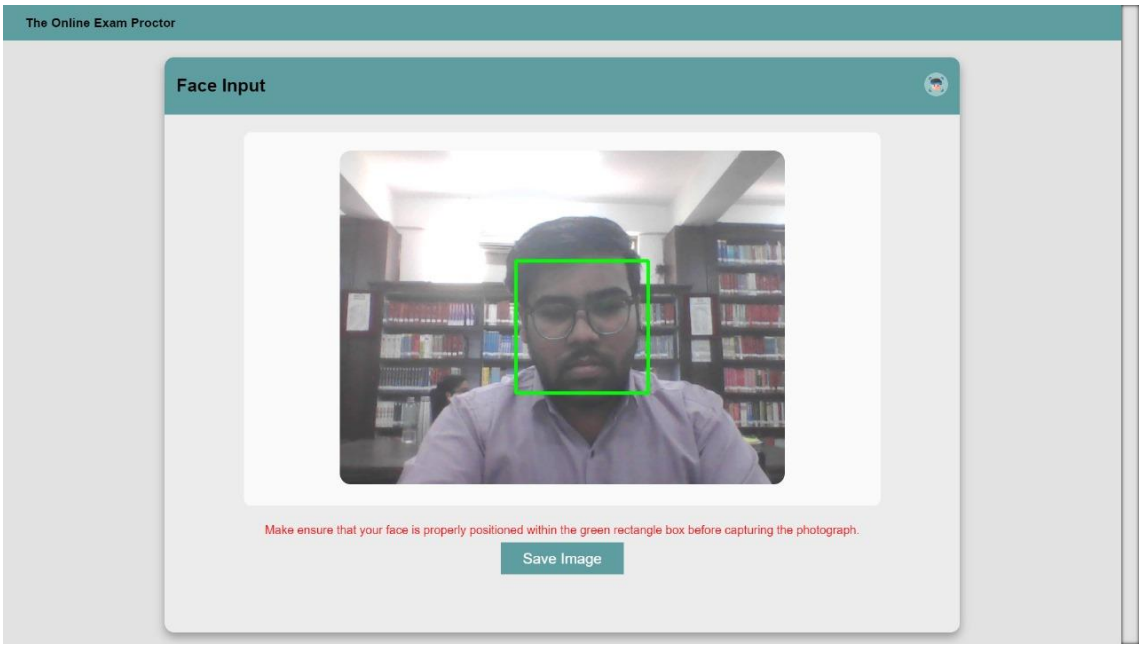

Fig 5.3 Authorization

5.4 System Compatibility:

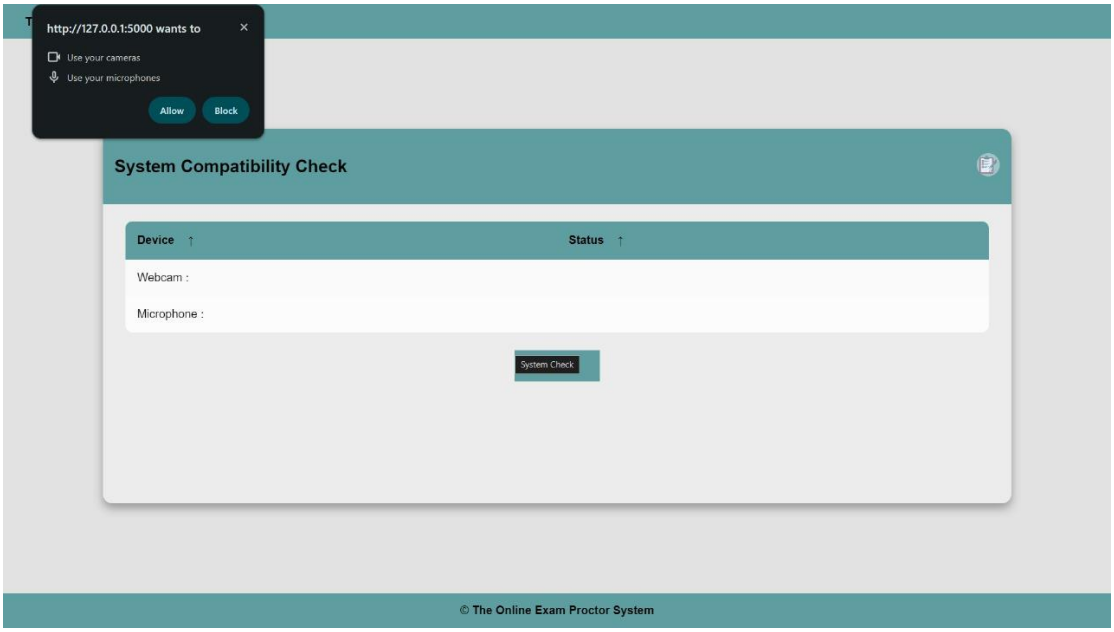

Fig 5.4 System Compatibility

5.5 Exam:

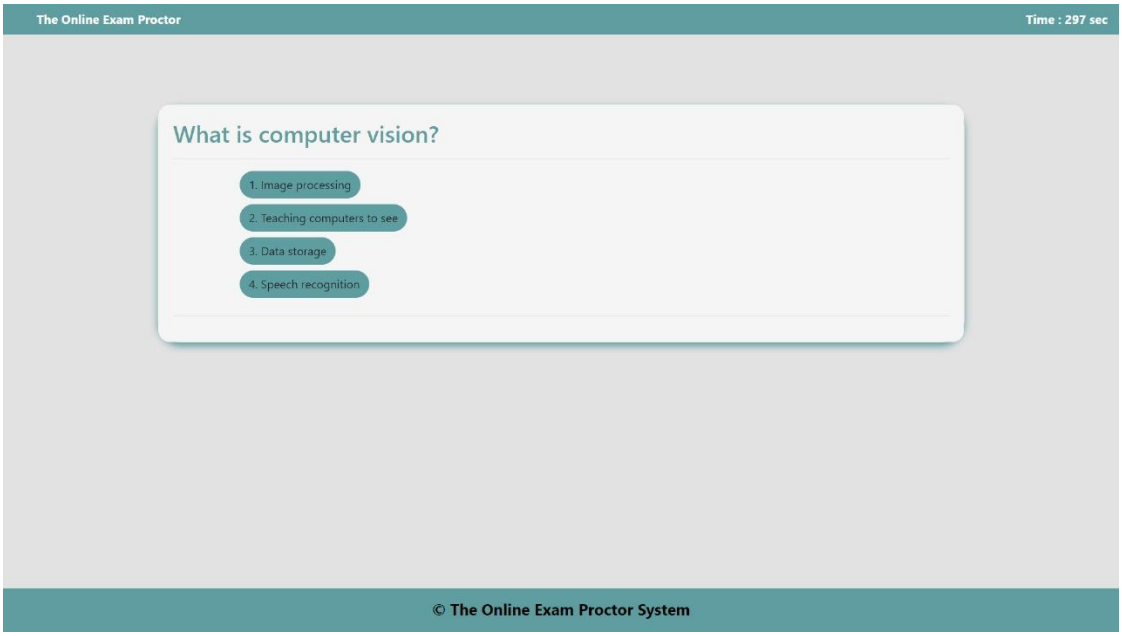

Fig 5.5 Exam

5.6 Dashboard:

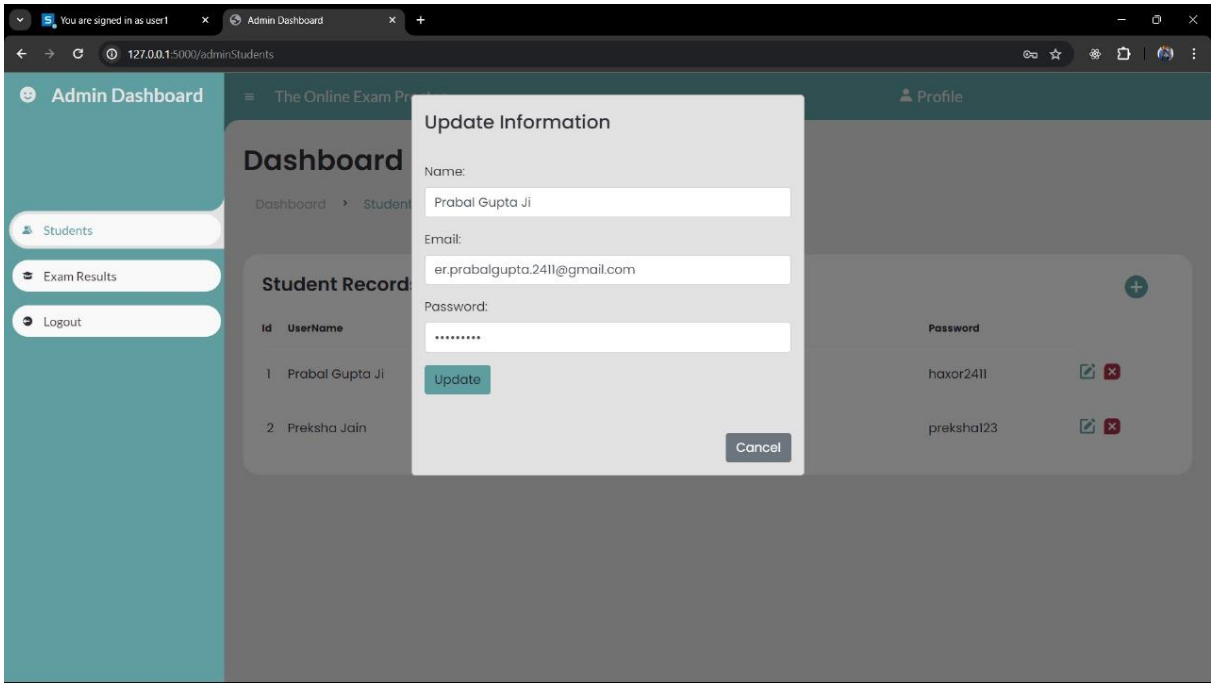

Fig 5.6 Dashboard

5.1.7 Violations Record:

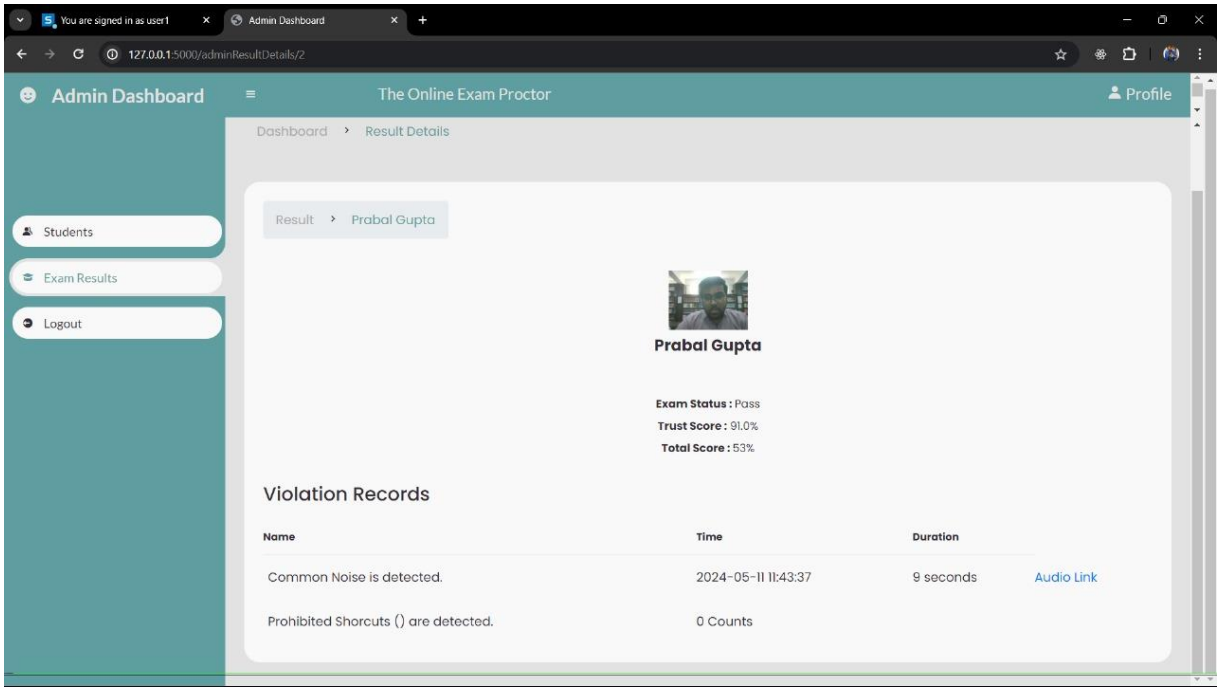

Fig 5.7 Violations Record

CHAPTER 6

6.1 CONCLUSION AND FUTURE WORK:

The development of an online proctoring tool is crucial in meeting the demands of remote education and ensuring the integrity of online assessments. By leveraging methodologies such as Agile, Iterative Development, and DevOps, teams can build robust and secure software that meets the evolving needs of educators and students.

Throughout this project, careful consideration of requirements, methodologies, and technologies has been paramount. The implementation of security measures, user-friendly interfaces, and scalable architectures ensures a seamless experience for both proctors and test-takers. Continuous testing, feedback, and adaptation help refine the tool, addressing any issues and enhancing its effectiveness.

6.2 Future Directions:

Looking ahead, there are several avenues for further development and improvement of online proctoring tools:

- Enhanced Security Features: Continued investment in security measures such as biometric authentication, facial recognition, and AI-driven anomaly detection to combat emerging threats and ensure exam integrity.

- Usability and Accessibility: Focus on improving user experience and accessibility, with customizable interfaces, support for assistive technologies, and seamless integration with learning management systems.

- Advanced Analytics: Utilize data analytics and machine learning algorithms to provide insights into exam performance, identify trends, and personalize learning experiences for students.

- Integration with Emerging Technologies: Explore integration with emerging technologies such as virtual reality (VR) and augmented reality (AR) to create immersive and interactive exam environments.

- Compliance and Regulations: Stay abreast of evolving regulations and compliance standards in education and data privacy, ensuring adherence to legal requirements and industry best practices.

- Global Adoption and Localization: Expand the reach of online proctoring tools to diverse geographical regions and languages, catering to the needs of international students and institutions.

By embracing these future directions and continually innovating, online proctoring tools can play a vital role in transforming the landscape of remote education, providing secure, accessible, and personalized assessment experiences for learners worldwide.

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8 https://www.researchgate.net/publication/348597317_An_Evaluation_of_Online_Proctoring_Tools

APPENDICES

1 Flow of the model

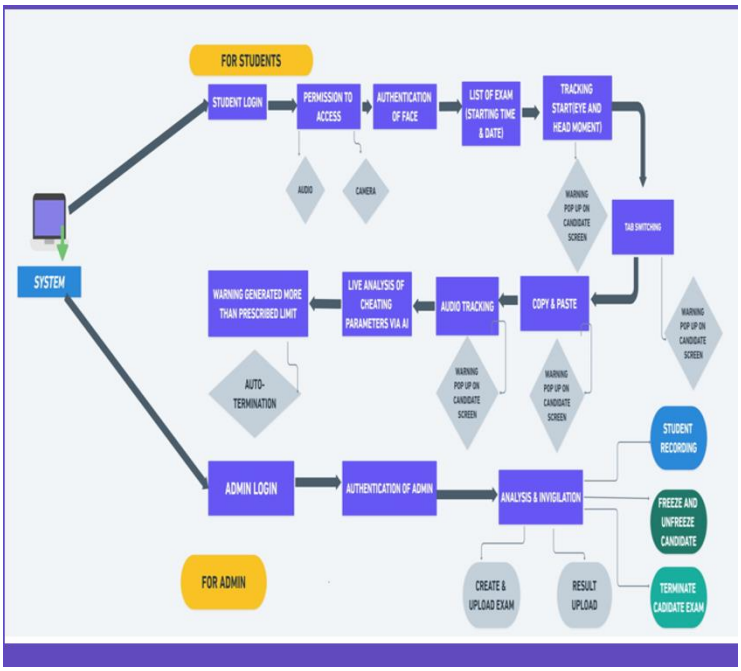

Fig 6 Flow of the model

2 GitHub link
https://github.com/haxor2411/DEACON---Online-Proctoring-Tool

3 YouTube Link
https://www.youtube.com/watch?v=6hMqkHBQAqI

PUBLICATIONS

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Automated Online Exam Proctoring - Computer Vision Lab

http://cvlab.cse.msu.edu/project-OEP.html (http://cvlab.cse.msu.edu/project-OEP.html)

ONLINE EXAM PROCTORING SYSTEM

https://ijcrt.org/papers/IJCRT2201560.pdf (https://ijcrt.org/papers/IJCRT2201560.pdf)

If you need them to explain everything on the vaccine label ...

https://www.england.nhs.uk/north-west/2021/06/09/if-you-need.... (https://www.england.nhs.uk/north-west/2021/06/09/if-you-need-them-to-explain-everything-on-the-vaccine-label-they-will-do-that-two-young-women-speak-out-about-why-they-decided-to-say-yes-to-the-covid-vaccine/)

A Systematic Review on AI-based Proctoring Systems: ...

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Covid_19 Impact- on Students

https://medium.com/@rinapawar14/covid-19-impact-on-students-.... (https://medium.com/@rinapawar14/covid-19-impact-on-students-798990f17482?responsesOpen=true)

A Systematic Review on AI-based Proctoring Systems: Past, Present ...

CURRICULUM VITAE

Team Member 1:

PREKSHA JAIN

(+91)8395865738 www.linkedin.com/in/prekshajain0311
https://github.com/prekshajain1101 prekshajain.0311@gmail.com

OBJECTIVE

To leverage my skills and knowledge in computer science and engineering to contribute effectively to a dynamic and innovative team, while continuously enhancing my expertise and learning in the field.

EDUCATION

▫ B.Tech CSE, NIET Gr. Noida (AKTU)	Expected 2025	82.3%
▫ 12th, DEWAN PUBLIC SCHOOL, Meerut (CBSE)	2021	95.2%
▫ 10th, DEWAN PUBLIC SCHOOL, Meerut (CBSE)	2019	93.4%

Programming: Python, Java, Fullstack Development, Node.js, React JS, Vue.js, Laravel, Django.
Software Development: Data Structure & Algorithm, Databases, IDEs, Programming Languages
Computer Programs & Software: Azure AI, StarUML, Cisco Packet Tracer, Git, Postman, VSCode, Eclipse.

ACHIEVEMENT

- Microsoft Learn - Collected over 28 badges and 10 Trophies
- Selected by Microsoft to Bangalore AI odyssey Tour 2024 and got a chance to interact with Satya Nadella on various topic of Artificial Intelligence.
- Completed Challenges of AI Odyssey - Develop NLP solutions with Azure AI, Develop solutions with Azure AI Document Intelligence, Create computer vision solutions with Azure AI Vision from Microsoft.
- Smart India Hackathon(2023) – Participated and Selected in internal level.
- Active Participation on CodeTantra, HacerRank , Geeks for Geeks etc.

CERTIFICATIONS

- Introduction to Artificial Intelligence (AI), Introduction to Cloud Computing, Data Structures, Introduction to Web Development with HTML, CSS, JavaScript, Object Oriented Programming in Java, Python for Data Science, AI & Development, Java Programming: Arrays, Lists, and Structured Data Coursera
- Programming Fundamental using Python, Data Structures and Algorithms using Python, Programming in C, Java Programming Fundamentals from Infosys Springboard
- HTML&CSS Tutorial and Projects Course (Flexbox&Grid) from Udemy

INTERNSHIP & PROJECT

- DEACON | An Online Proctoring Tool (Python, OpenCV, React JS) (Ongoing)
- Personal-Portfolio(HTML, CSS, JavaScript)
- Language Translator(JavaScript)

Team Member 2:

PRABAL GUPTA

(+91) 6398418095
www.github.com/haxor2411
www.linkedin.com/in/prabalgupta2411
pravalgupta2002@gmail.com

OBJECTIVE

To work as a Software Development Engineer and to pursue a job opportunity in a competitive environment in your progressive organization that allows me the scope to update my knowledge to the latest trends and be part of a diverse and dynamic team that adds to both my personal and professional growth.

EDUCATION

▫ B.Tech CSE, NIET Gr. Noida (AKTU)	Expected 2025	85.7%
▫ 12th, RLVM, Hathras (CBSE)	2020	90.6%
▫ 10th, RLVM, Hathras CBSE)	2018	95.4%

TECHNICAL SKILLS

Programming Languages:
Python, Java, C++ (Basic), JavaScript
Frameworks: Full stack Development, Cybersecurity, Node.js, ReactJS, Vue.js, Laravel, Django, Angular
Software Development: Data Structure & Algorithm, Databases, IDEs, Programming Languages
Computer Programs & Software: Azure AI, StarUML, Cisco Packet Tracer, Git, Postman, VSCode, Eclipse, Oracle, Spring Boot

INTERNSHIP & PROJECT

- DEACON | An Online Proctoring Tool (Python, OpenCV, React JS) (Ongoing)
- Personal – Portfolio (HTML, CSS, JavaScript)
- Todos List (React JS)
- An NGO Website www.alivefoundation.in (MyPhpAdmin, WordPress, cPanel)

ACHIEVEMENT

- Invited by Microsoft to Bangalore AI Tour 2024 with VIP Champions Pass and got a chance to interactwith Satya Nadella and other EVPs and President Puneet Chandok Sir.
- Completed Challenges of AI Odyssey - Develop NLP solutions with Azure AI, Develop solutions withAzure AI Document Intelligence, Create computer vision solutions with Azure AI Vision from Microsoft.
- Collected over 27 badges and 9 Trophies in Microsoft Learn.
- Verified Skill and Badges on HackerRank.

CERTIFICATIONS

- Python (Basic), Problem Solving (Basic) & SQL (Basic) from HackerRank.
- Introduction to Artificial Intelligence (AI), Introduction to Cloud Computing, Data Structures, Introduction to Web Development with HTML, CSS, JavaScript, Object Oriented Programming in Java, Python for Data Science, AI & Development, Java Programming: Arrays, Lists, and Structured Data Coursera
- Programming Fundamental using Python, Data Structures and Algorithms using Python, Programming in C, Java Programming Fundamentals from Infosys Springboard
- The Complete Ethical Hacking Course from Udemy

Team Member 3:

Abhishek Nath Tiwari

Pre-Final Year CSE Undergrad

er.abhisheknathtiwari@gmail.com | LinkedIn | Leetcode | Github

Education

- **Noida Institute of Engineering and Technology** — Gautam Buddh Nagar, India
  Bachelor of Technology - Computer Science Engineering; CGPA: 8.52 — *July 2021 - July 2025*
- **PNN Mohan Public School** — Vasundhara, India
  Class 12(PCM); 89% — *July 2019 - March 2021*

Skills Summary

- **Languages**: Python, C++, C, JavaScript, SQL, JAVA
- **Frameworks**: Scikit, ReactJS, Numpy, Django, Flask, NodeJS
- **Database**: Oracle, MySQL, PostgreSQL, MongoDB
- **Platforms**: Linux, Web, Windows, AWS, IBM Cloud
- **Soft Skills**: Leadership, Event Management, Writing, Public Speaking, Time Management

Experience

- **Fanden India** — Remote
  Web Developer Intern — *June 2023 – July 2023*
  - **Restructuring Website:**: Worked on the official website of the FanDen India.
  - **Used MERN Stack**: Used react for frontend part, node for backend part and mongodb for database part.
  - **Completion on time:**: Created and Deployed the Website in one month.
- **JP Morgan Chase Co.** — Remote
  Software Engineering Virtual Intern — *July 2022 – Aug 2022*
  - **Interface with a stock price data feed**: Makes Changes in python code to learn about stock price interface
  - **Use JP Morgan Chase frameworks and tools.**: Used tools to makes changes in python code and get different types of results.
  - **Display data visually for trader**: Created code to display the final trading results for trader.

Projects

- **Weather Forecast Web App(Reactjs, CSS, Weather API, Geolocation API)**: Designed and developed a responsive weather forecast application using React, providing real-time weather information to users for improved planning and decision-making.Web page is responsive and also shows wheather of next seven days.
- **Simple Music Player(HTML, CSS, JavaScript)**: Created a Music Player website,where user can listen music, suffle songs, play in back- ground.Web page is responsive and simple user friendly interface.Used HTML to make the layout of the website. Used JavaScript to access the music from system and to make the website Dynamic.
- **Vehicle and Electronic Price Prediction (Machine Learning Algorithms(Random forest, Linear Regression, Numpy, Matplotlib)**: Developed a machine learning model to predict prices of vehicles and electronic items based on relevant features, contributing to accurate pricing strategies and informed decision-making. Web page have different section for both the Electronic and Vehicle ,from we can predict by giving value. Technology Used:Python,Scikit-Learn,Pandas,Matplotlib,Jupyter Notebook,Web development tools (for interface of web page)
- **Code-Acces (web app)**: (Work in progress) Creating a web app that allows users to save, share and edit their code snippets. Technology Used: Reactjs, Nodejs, MongoDB

Coursework

- Operating Systems
- Data Structures
- Analysis Of Algorithms
- Web Technology
- Machine Learning
- DBMS
- Object Oriented Programming
- Java Programming

Achievements

- Participated in ICPC 2023 and got rank 1 in college
- Got rank 796 in Leetcode Biweekly 116 Contest
- Got rank 69 in Coding Ninjas weekly contest 64.
- Python HackerRank Certified.
- 1876(knight) rating on Leetcode.
- 1441(specialist) rating on Codeforces.
- Problem Solving HackerRank Certified.
- Solved more than 500 Questions on Leetcode,GFG,Codeforces.

Team Member 4:

TANISHK

(+91)8800526791 www.linkedin.com/in/tanishk-a10566228
https://github.com/phionex2 tanishk.9868@gmail.com

EDUCATION

Kendriya Vidyalaya JNU Campus

New Delhi

CLASS 10th – 89.67% 2019
CLASS 12th – 91% 2021

Noida Institute of Engineering and Technology (AKTU)

Greater Noida, India

BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING) 2021-2025

- Ist Year: 9.17cgpa
- IInd Year: 9.02cgpa

TECHNICAL SKILLS

Programming: Python, C++, Full stack Development
Software Development: Data Structure & Algorithm, Databases, IDEs, Programming Languages
Computer Programs & Software: Azure AI, StarUML, Cisco Packet Tracer, Git, Postman, VSCode, Eclipse.
Libraries/Framework: CSS, NumPy, Pandas, Matplotlib, Bootstrap

ACHIEVEMENT

- Invited by Microsoft to Bangalore AI Tour with VIP Champions Pass and got a chance to interact with Satya Nadella and him other EVPs and President Puneet Chandok Sir and got the chance to click the picture with Satya Nadella.
- Completed Challenges of AI Odyssey - Develop NLP solutions with Azure AI, Develop solutions with Azure AI Document Intelligence, Create computer vision solutions with Azure AI Vision from Microsoft.
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- Programming Fundamental using Python, Data Structures and Algorithms using Python, Programming in C, Java Programming Fundamentals from Infosys Springboard.
- Web Development Bootcamp and Machine Learning from Udemy

INTERNSHIP & PROJECT

PROJECTS:

- DEACON | An Online Proctoring Tool (Python, OpenCV, React JS) *SmarthIndiaHackathon*
- Handwritten-Digit-Classification (DEEPLEARNING)
- Maintaining an Deep Learning Repository(Major Concepts Related to Deep Learning)

STEM Connect Virtual Experience Program at Deloitte - Forage *August 2022*

- Created an algorithm to unify 2 different data models, Build an dashboard to explore the client's elementary data, Identifying the security issue which lead to a leak of private company Information.
- Technologies Used – Tableau, Libre Office, Repl it.