E-EXAM ATTENDENCE MONITORING SYSTEM

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ABSTRACT-This project proposes a webcam-based monitoring system that takes attendance of online exams to reduce the problem of truancy during online tests. The webcam-based facial recognition system uses standard webcam properties to automatically and accurately identify and verify students in real time. With a focus on frontal face features analyzed and drawn out, it assures that no one may take examinations on behalf of any registered candidates, thus lowering the possibility of collusion and enhancing the integrity of the administrative process. The simple interface will enable easy access to attendance data for both students and instructors, while the auto-generated reports will allow for comprehending and reasoning between some attendance patterns and discrepancies.This new method, however, does not only simplify the attendance monitoring but also provides an examination atmosphere for conducting its exam free from impersonation, thus protecting academic integrity during online evaluations. This project intends to improve the validity and efficiency of online exams via effective attendance management.

1.INTRODUCTION

The e-Exam Attendance Monitoring System is a unique enterprising digital technology designed to bring signature into the process of knowledge assessment, integrated with webcam attendance monitoring and secure identity verification in one interface. A system that was built around Flask as a web framework, SQLite as a data storage medium, and tools such as OpenCV for image processing provides an alternative mechanism through which written exams are to be administered with minimum chances of erred fairness and authenticity. The underlying concept of this system is to make a shift in all error-prone manual routines to automated work sequences. From electronic methods to identify candidates' identities, monitor exam environments, and to entry into a seamless recording for attendance-the key functions include user registration with image verification process, secure login challenged by CAPTCHA, student and administrator roles assigned for access control, real-time monitoring via webcam feeds. This system will involve SendGrid for email notification to change password with the latest updates regarding exams. Environmental checks for lighting and voice are done to assure that the exam is being taken honestly without any form or resources available to the candidate that could give him/her more of an advantage over other candidates. It creates a large framework of allowing the administrator to enable something like attendance management function into the simpler ones of test creation, evaluation matrix, or feedback process in order to provide efficiency and transparency. It is designed for educational institutions interested in securing their examinations by spending less time doing administrative duties while significantly increasing the accuracy of attendance and evaluations.

It is modular, hence easily scalable to be applied to small colleges or big universities.A unique webcam-based monitoring system for e-exam attendance is proposed in this paper with the purpose of making the attendance process of students at online exams more straightforward. The system, which is capable of working with standard webcams, uses the facial recognition

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technology, in real time and in an accurate manner to identify and verify students. By means of taking pictures of candidates' faces and extracting properties from these images, the system ensures that only those candidates who have been pre-registered are present during the exam, which minimizes impersonation and thus ensures the validity of the evaluation process[1-22]

2.LITERATURE SURVEY

2023: "An Enhanced E-Exam Proctoring System Using Image Processing and AI-Based Authentication."

- **Authors:**Priya, R., & Vinothkumar, V.
- **Description:**The system captures students' images and analyzes their behavior during exams to detect any irregularities. By employing AI algorithms, the project aims to improve the accuracy of identity verification and cheating detection. The authors emphasize the importance of maintaining academic integrity in online assessments and propose their system as a solution to current challenges.

2021: "Automated Attendance and Proctoring System Using Image Processing and Machine Learning."

- **Authors**: Sinha, A., & Kaur, R**.**
- **Description:**This project integrates attendance monitoring and proctoring into a single automated system using image processing and machine learning techniques. The system captures images of students for attendance and employs facial recognition to verify identities during online exams. By combining these functionalities, the project aims to streamline administrative tasks in educational institutions while enhancing the security of online assessments. The authors highlight the potential of such systems to improve efficiency and reduce the burden on educators.

2020: "Real-Time Face Recognition System for Remote Proctoring in Online Exams."

- **Authors:**Bhatti, M. T., Khan, M. S., & Aslam, M
- **Description**:This project presents a real-time face recognition system designed for remote proctoring during online exams. The system captures students' images and verifies their identities throughout the examination process. By ensuring that the registered student is taking the exam, the project aims to prevent impersonation and maintain the integrity of online assessments. The authors discuss the technical challenges and solutions involved in implementing a reliable face recognition system for educational purposes.

2019: "Student Attendance Monitoring System Using Image Processing."

- **Authors:** Matilda, S., & Shahin, S.
- **Description:**This project presents a student attendance monitoring system that leverages image processing techniques to automate the attendance-taking process. The system utilizes a camera to capture images of students as they enter the classroom. By employing facial recognition algorithms, it identifies students and marks their attendance in real-time. This approach reduces the manual effort involved in attendance management and minimizes errors associated with traditional methods. The project highlights the potential of image processing in educational settings, aiming to enhance efficiency and accuracy in attendance tracking.

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3.PROBLEM STATEMENT

The move to online examinations has given rise to a lot of troubles in identifying and confirming student identities and in earning their academic integrity. Regular means of attendance keep on being the hardest and most fraudulent ones, which is why personal data and swipe cards are becoming the main targets of cheaters and impersonators. Teachers are most of the time without the appropriate means of control over the students till the time of the exam, which brings about extensive variation between the actual process and the evaluation process. Moreover, manual attendance tracking can be time-consuming. Thus, the need for a reliable program that will tackle not only the problem of attendance but also automate the identity verification and eliminate the risks of the current situation is real and it is to be done in a very secure way of on-line examinations.

4.EXISTING SYSTEM

Ensuring post-COVID–19 procedures, online exam attendance monitoring is one of the key components described in the new model. A number of complexities are resolved by the system, which is developed to simplify and secure the process of monitoring student attendance during examinations while ensuring security of the system. A unique feature of the system is its ability to record online attendance based on exact time points when the students logged in and out. The system has an interface that is easy to use and helps to limit disturbances and distractions, which is why students can fully concentrate on the test; therefore, an online environment of concentration is provided. Other than that, the system has a real sky monitoring system, which continually follows students during the test without allowing human factors and responsibilities to be applied, and deletes the human elements. Considering the shared and integrated ID verification factor will definitely help to improve security by including biometric features such as facial recognition, or the detection of a webcam, and it will allow the possibility for SSO at the beginning of the exam with no more verifications. In addition, the system creates in-depth automated post-exam reports that enable data analytics to evaluate attendance patterns with the utilization of manual work thereby, they are leading to the overall improvement of the examination process.

Limitations:

A technology-based e-exam attendance monitoring system could be an effective way to keep track of the students who take online exams. Although, there are some drawbacks for considering:

1.Technical Issues: Students and examiners might get connected to unstable network, have faulty hardware, or glitchy software causing the system to be unsteady in checking the attendance.

2. Authentication Challenges: Ensuring that the correct student is attending the exam can be very hard. Even though the systems might use biometric security as well as video monitoring, they sometimes fail or fail to detect any breaches and might be mishandled as well.

3. Privacy Concerns: The process of videos being transmitted and student data collection for geolocation purposes may lead to privacy breaches for the students involved if privacy is not considered.

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4. Cheating Risks: Even though monitoring systems are in place, students may still want to use unauthorized devices or access test content by the help of alternative screens. Nonetheless, such systems might not be thoroughly effective in terms of identifying cheaters, in particular, if video or audio surveillance methods are the only tools for monitoring.

5.PROPOSED SYSTEM

The e-Exam Attendance Monitoring System is a web-based solution that is invented to modernize the examination process through advanced technologies for security, automation, and monitoring. It makes use of Flask for back-end programming, SQLite for persistent storage, and OpenCV for various image processing tasks, such as face detection and its comparison. Students upon registration upload their profile and ID card images that are verified by the system in order to confirm their identifications with a view to providing access to the exams. There are two roles within this system: students who will have a chance to take exams on a dashboard, and the administrators who govern tests, evaluations, and attendance. Webcam-based attendance monitoring ensures that images are taken during exams for comparison against registered profiles to avoid impersonation. Environmental conditions pertaining to light and audio for the exam are monitored to provide control over the exam situation while face detection checks real-time presence of a candidate.

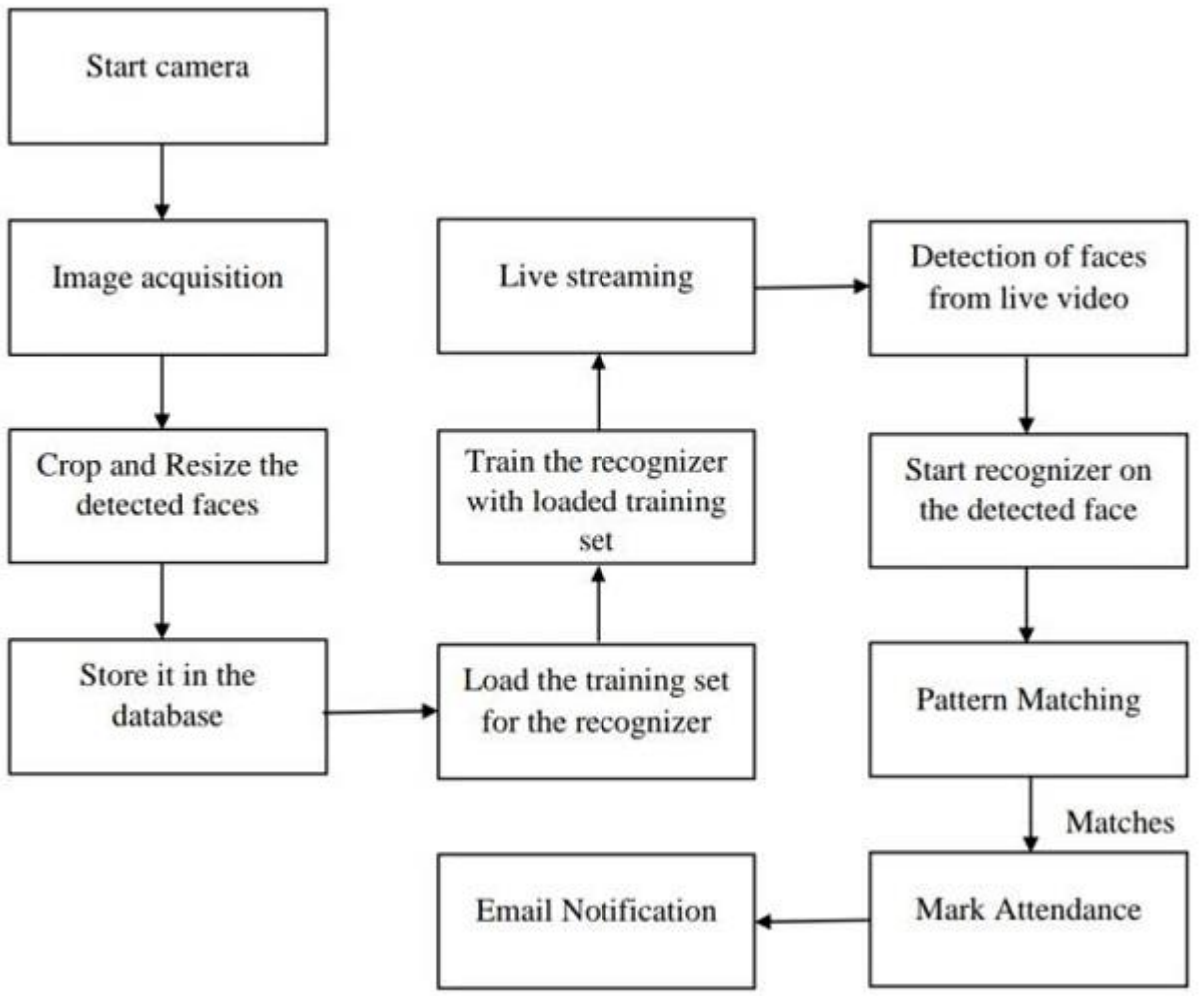

Fig 1:The proposed system architecture

CAPTCHA during login reinforces security as well as a hashed password and, in addition, a password reset feature through an OTP is done with the aid of SendGrid. Regarding written exams, that would be control since images are to be captured and monitored periodically for purposes of attendance. Administrators are able to define tests by specifying questions, and evaluation

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of submissions can be done, with remarks appended for further clarification. The intention of this system is to provide a very secure, extendable, and user-friendly platform that reduces human intervention and maximizes integrity during an examination, whereby the amenable dashboards render useful information to be consumed by modern schools.

6.METHODOLOGY

The methodology of theE-Exam Attendence Monitoring System is structured into several key phases: Model Creation,Image Processing, Image feature extraction, Model Evaluation. Each phase plays a crucial role in ensuring the system's accuracy and reliability.

1.Model Creation: The system employs a modular approach rather than a traditional machine learning model, encapsulated in the ImageComparison class. The ImageComparison class is designed with methods to preprocess images, detect faces, extract features, and compare them.It relies on OpenCV for face detection and feature extraction, potentially using pre-trained models like Haar cascades or deep learning embeddings for face recognition.The pipeline involves loading images, detecting faces, extracting feature vectors, and comparing them using similarity metrics like Structural Similarity Index or cosine similarity.

2. Image Processing: Image processing is integral for identity verification and attendance tracking. Images are resized, converted to grayscale, and filtered to reduce noise, ensuring consistency across comparisons. The detect_faces function uses OpenCV's Haar cascades to identify faces in profile, ID card, and webcam images, ensuring valid inputs. Functions like check_lighting calculate brightness levels by analyzing pixel intensities, while check_audio_level monitors ambient noise to ensure a controlled exam environment.

3. Image Features Extraction: Feature extraction enables robust image comparison, post-detection, facial landmarks are extracted using OpenCV or Dlib, creating a geometric representation of the face.These landmarks are transformed into numerical vectors, capturing unique facial characteristics. Techniques like HOG or ORB descriptors may be employed. Features are extracted on-the-fly during registration and attendance checks, minimizing storage overhead while ensuring accuracy.

4. Image Comparison: The Image Comparison class facilitates identity verification, during registration, profile and ID card images are compared. The compareimages method returns a match status based on feature similarity. Metrics like SSIM, cosine similarity, or Euclidean distance are used to quantify similarity, with thresholds determining matches. Webcam images captured during exams are compared against the registered profile, ensuring continuous identity verification.

5. Model Evaluation: Evaluation focuses on functional accuracy and reliability The detect_faces function is tested across diverse lighting and angles to ensure robustness. The compare_images method is evaluated using datasets of matching and non-matching images, measuring false positives/negatives The check_lighting and check_audio_level functions are validated by simulating varied exam conditions, ensuring accurate flagging of issues. Mock exams are conducted to assess the system's ability to track attendance, verify identities, and manage evaluations seamlessly.

7.PROJECT REQUIREMENTS

Front End:

a.HTML

b.CSS

HTML: HyperText Markup Language (HTML) serves as the foundational structure for any website. It is used to create a basic framework that web designers can later enhance with advanced layouts and designs. HTML organizes elements such as text,

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images, hyperlinks, and other content into distinct tags, making it easier to manage and maintain the website's structure without confusion.

CSS: Cascading Style Sheets (CSS) is a styling language used to enhance and standardize the appearance of a website. While HTML provides the basic structure of the site, CSS is used to refine and improve its layout, design, and overall presentation.

Back End:

a. Python
b. Flask
c. Sqlite3

Python: Python is a versatile and user-friendly programming language known for its clear syntax and ease of use. It is widely applied in fields such as web development, data analysis, machine learning, natural language processing, automation, and many other areas.

Flask: Flask is a lightweight web framework for Python. It's often referred to as a "micro" framework because it doesn't require particular tools or libraries, making it simple and flexible. Flask is designed for simplicity, and it's ideal for small to medium-sized web applications.

Routing: It has a simple routing system where you can map URLs to Python functions.

Extensions: It can be extended with various libraries (e.g., Flask-SQL Alchemy for databases, Flask-WTF for forms, etc.).

Sqlite3: Data is stored in a single file on disk, making it lightweight and easy to use for local data storage. It is widely used in embedded systems.

key features of SQLite3:

Zero Configuration: No server setup is required, and the database is a single file on the filesystem.

Cross-platform: SQLite3 databases can be used on all major operating systems.

Compact: The database is stored in a single file, which is easy to manage and deploy.

8.SCREENSHOTS

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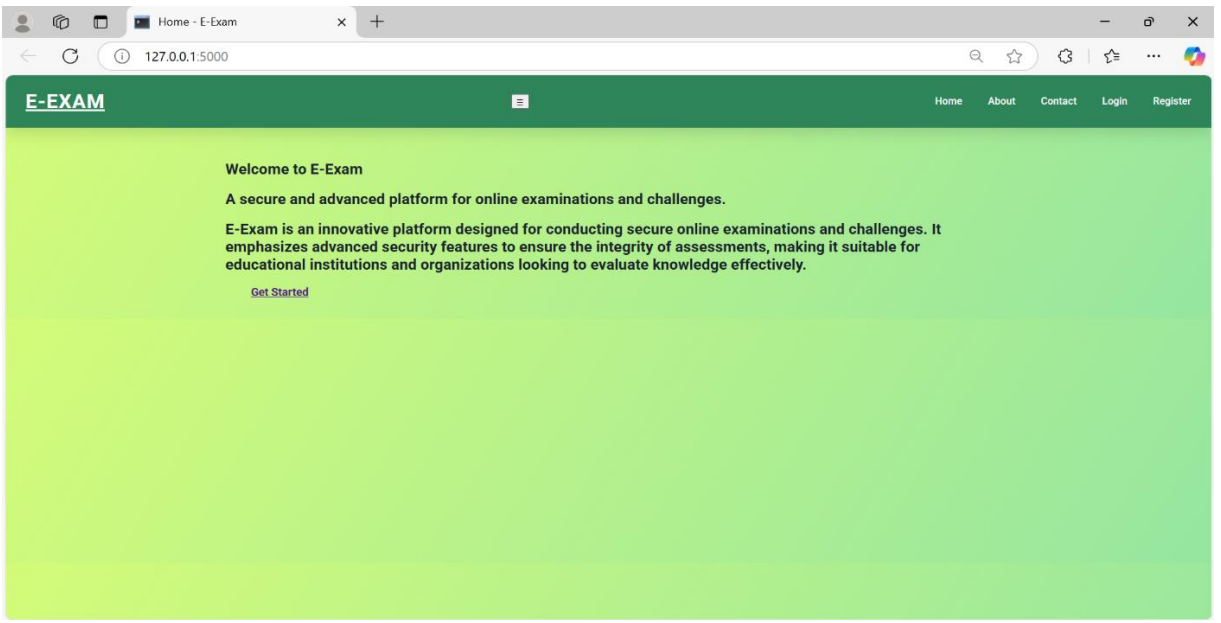

Fig1: Home page

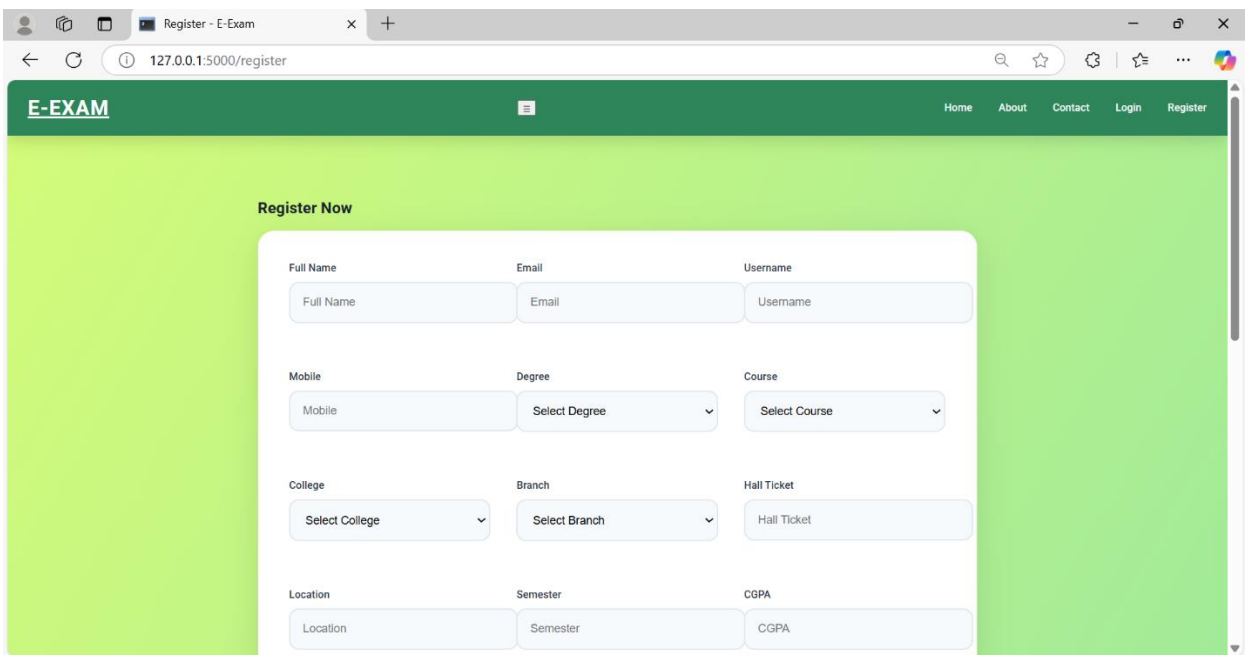

Fig2.1: Register page

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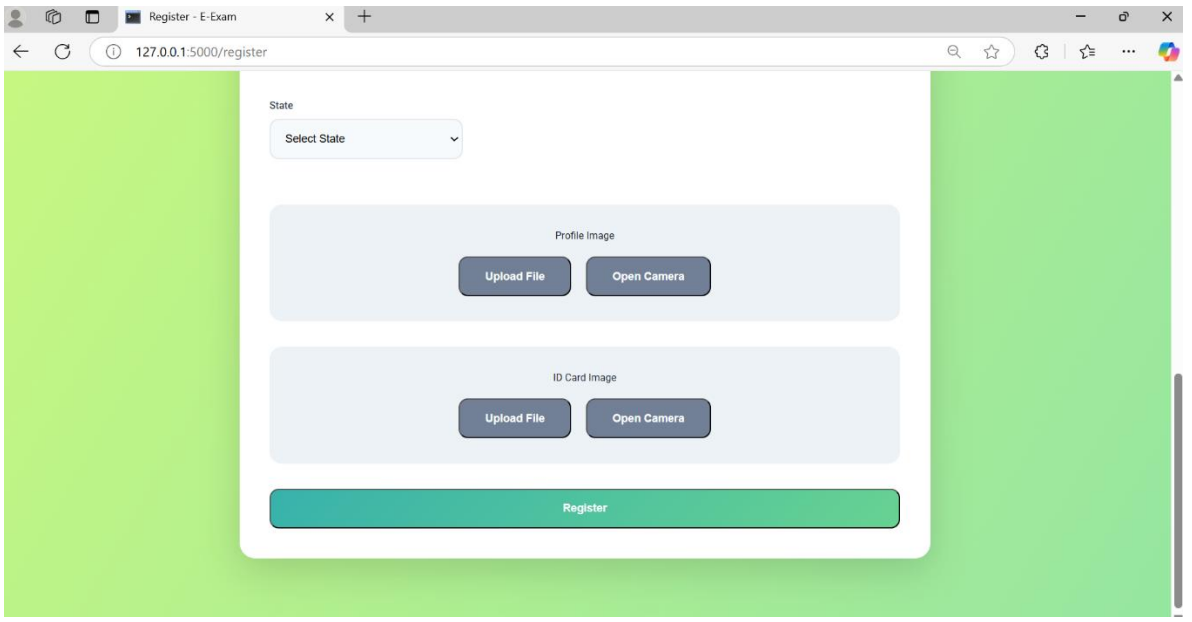

Fig2.2: Register page

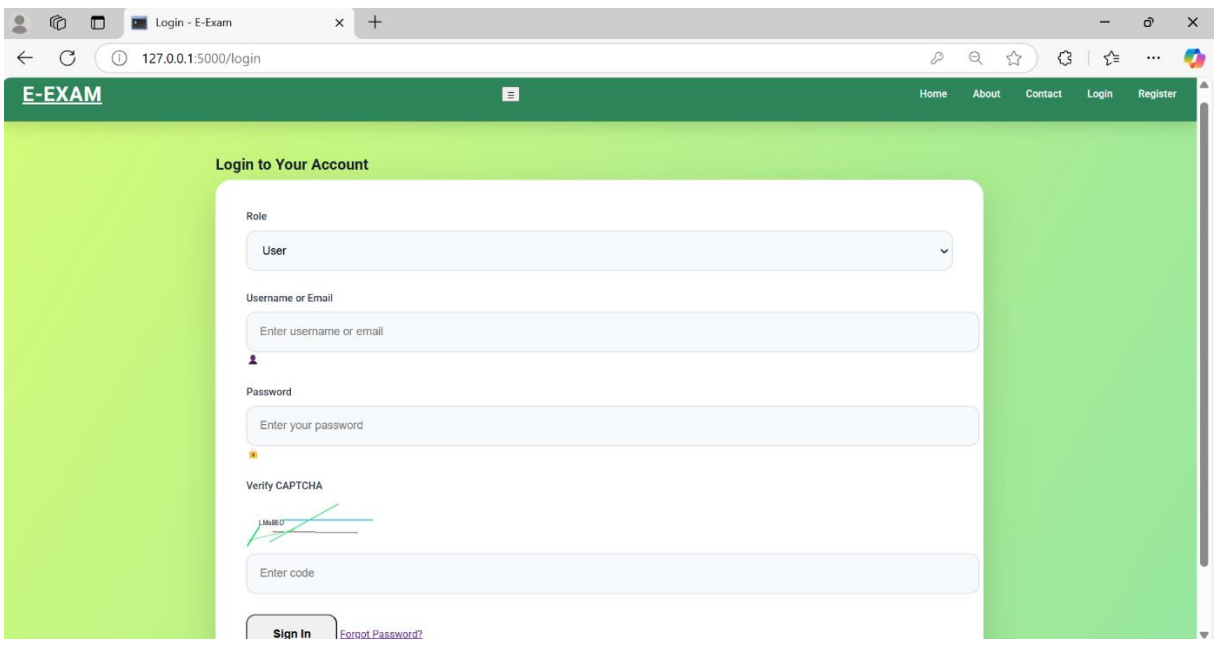

Fig3: Login page

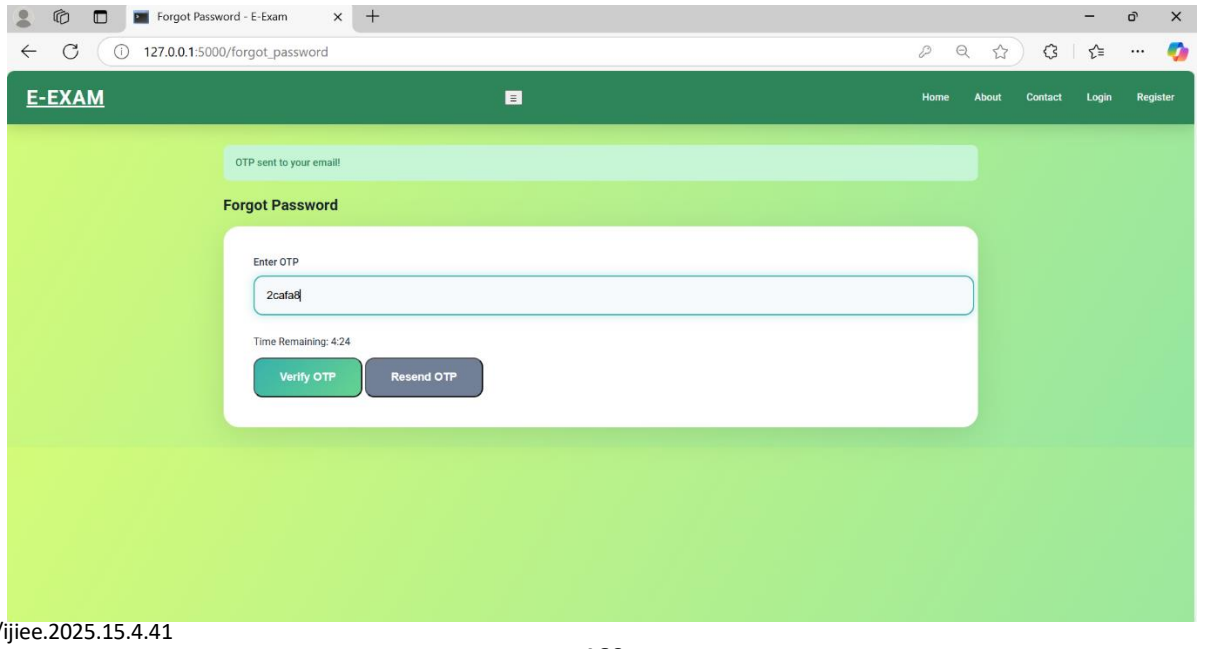

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Fig4: Forgot password

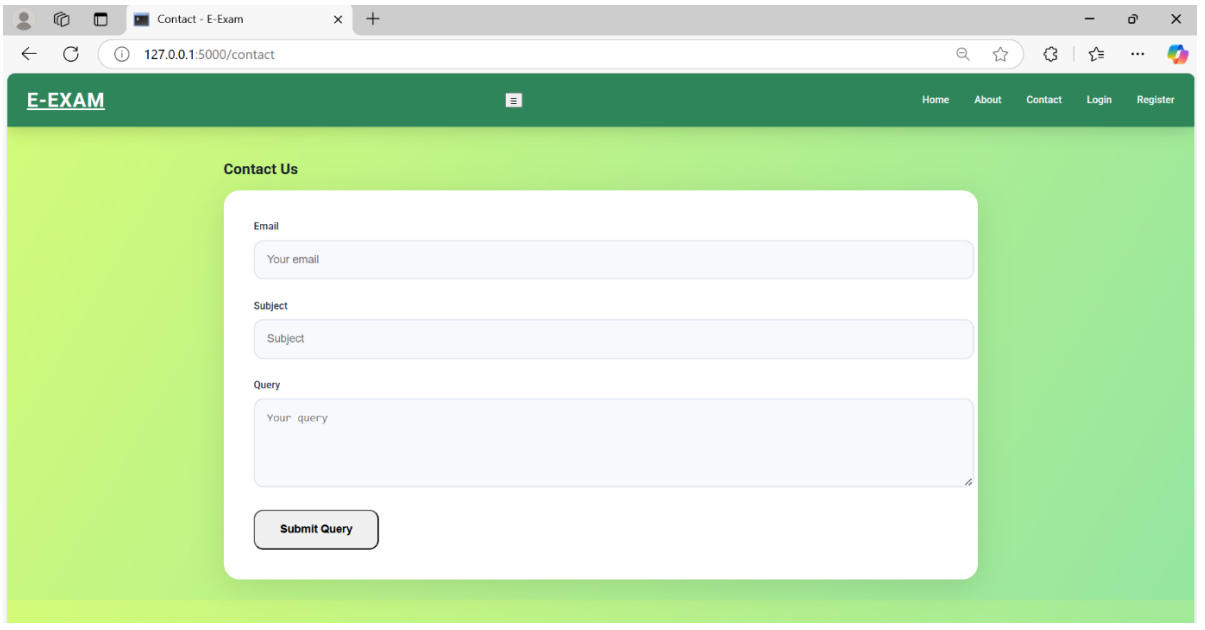

Fig5: contact page

9.CONCLUSION

In Conclusion,E-Exam AttendanceMonitoring system.In fact, with an integration of webcam attendance, identity verification, and adequate exam management, the e-Exam Attendance Monitoring System is going to change the way examinations are monitored. It substitutes manual work for automatic work to reduce human errors concerning attendance and an extra means of ensuring the integrity of examinations with real-time monitoring of identity and the environment. Basis of a light and powerful system architecture on Flask and SQLite, yet it provides certain security features for trust and accessibility through CAPTCHA, password hashing, and OTP reset services. For the administrators-create tests, grade submissions, and feedback to students-there are tools to better demonstrate transparency in grading. The user-friendly way of the students coming into the e-Exams and monitoring milestones with ease. Real-time face detection and environmental monitoring, its major emphasis defining a secure exam, set standards above traditional methods with their drawbacks. Future improvements may include ML-based advanced face recognition along with embedded system support of health monitoring during the exams and cloud deployment for better collaboration. Thus, the e-Exam system itself is a state-of-the-art showcase of technological advancement, meant to modernize learning, and an immensely scalable, secure, and efficient system that could change the way examinations are conducted in academic institutes across the globe.

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