



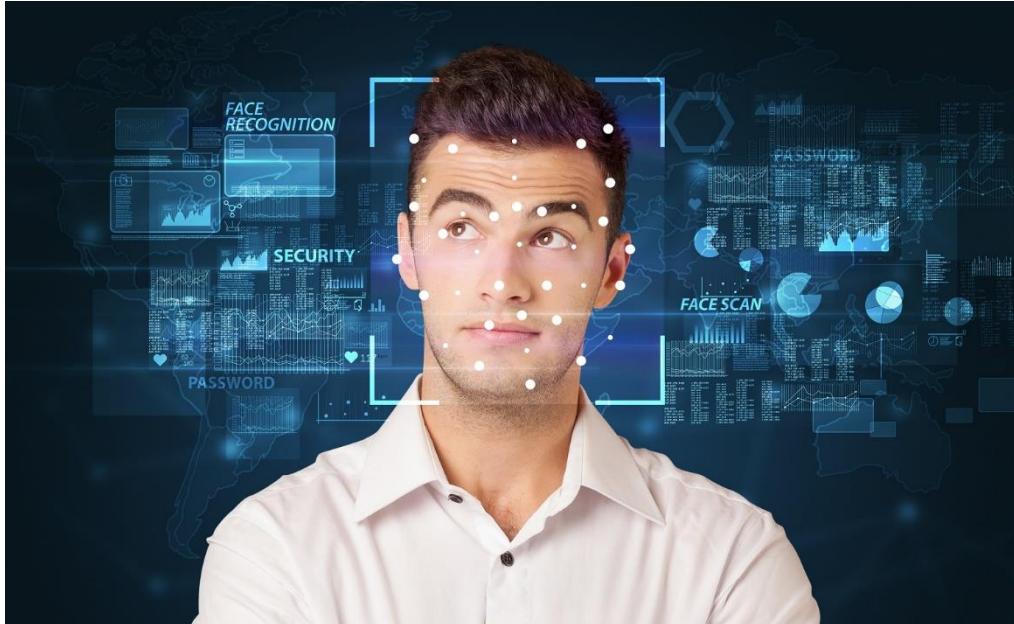
Symbiosis Skills and Professional University

Kiwale, Pune

PROJECT REPORT

On

“Face Recognition and Attendance System”



Submitted by

- 1) Mayur Borse**
- 2) Mukesh Kale**

DA- Batch FST02:DA03

Under The Guidance of

Trainer's Name: 1) Ritviz Singh
2) Shiv Patel

STUDENT DECLARATION AND ATTESTATION BY TRAINER

I'm Mayur Borse, Mukesh Kale , at A student **Symbiosis Skills and Professional University**, hereby declare and attest that we understand and agree to comply with the rules and regulation pertaining to the Face Recognition and Attendance System implemented by the intuition.

Name of Students: - 1) Mayur Borse
 2) Mukesh Kale

Course: Data Associate

CERTIFICATE

This is to certify that the report entitled, "**Face recognition and attendance system**" submitted by
"1) Mayur Borse, 2)Mukesh Kale " to Symbiosis Skills and Professional University, Pune, Maharashtra,
India, is a record of bonafide Project work carried out by
him under my supervision and guidance and is worthy of consideration for the completion of
certificate course in 'Data Associate'.

Signature of Trainer

Name of Trainer

Date: / / 2024

Supervisor

Date:

Supervisor

ACKNOWLEDGEMENTS

We extend our sincere appreciation to all those who contributed significantly to the successful development of the "Face Recognition and Attendance System" by Team Mayur Borse, Mukesh Kale , under the guidance of **Ritviz Singh and Shiv Patel at Symbiosis Centre of Distance Learning.**

Our team members have exhibited unwavering dedication, bringing a wealth of diverse skills to the project, resulting in the creation of an innovative system that seamlessly integrates technology with practical application.

Heartfelt thanks are extended to our esteemed project guides, **Ritviz Singh and Shiv Patel**, for their invaluable mentorship and technical expertise. Their guidance has not only shaped the project's technical aspects but has also ensured its alignment with the high academic standards of **Symbiosis Centre of Distance Learning.**

Team -

1)Mayur Borse

2) Mukesh Kale

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1. PLAN OF CAPSTONE PROJECT

1.1) Purpose of Project: -

- Accuracy Improvement:

The project intends to improve the accuracy of attendance records by leveraging biometric data for identification, minimizing errors associated with traditional methods.

- Time-Saving Solution:

The system aims to save time for both students and faculty by providing a quick and seamless method for attendance, eliminating the need for manual processes.

- User-Friendly Implementation:

The project emphasizes creating a user-friendly interface to encourage widespread adoption, making the system accessible and easy to use for both students and faculty within the educational institution.

- Real-time Monitoring:

The system's implementation enables real-time monitoring of attendance, providing immediate insights into student or staff presence. This feature is particularly valuable for identifying and addressing attendance-related issues promptly.

- Data Analysis and Reporting:

The project aims to incorporate data analysis and reporting capabilities. This allows for the generation of comprehensive attendance reports, helping faculty and administrators make informed decisions based on attendance trends and patterns.

- Improved Security:

Face recognition adds an extra layer of security to the attendance system. By uniquely identifying individuals based on facial features, the system helps prevent unauthorized attendance and ensures the accuracy of recorded data.

- Accuracy Improvement:

The project intends to improve the accuracy of attendance records by leveraging biometric data for identification, minimizing errors associated with traditional methods.

1.2) Period of Project: -

For a small to medium-scale "Face Recognition and Attendance System" project, the estimated duration is generally within the range of 3 to 6 months. The timeline will be influenced by factors such as project complexity, team size, available resources, and the specific features and functionalities included in the system. Efficient planning and execution of phases like requirements gathering, design, development, testing, and implementation are key to staying within this timeframe.

1.3) Problem Statement Detailing: -

- i) Implement accurate face detection:** Utilize Haarcascade classifiers to effectively detect faces within images or video frames. Optimize detection for varying lighting conditions, angles, and occlusions.
- ii) Recognize individuals using LBPH:** Train the LBPH algorithm on a dataset of labeled faces to create face recognition models. Achieve high recognition accuracy with efficient model representation and matching
- iii) Ensure real-time performance:** Process video streams efficiently to provide real-time attendance tracking. Optimize code for speed and resource usage, potentially using techniques like multithreading or GPU acceleration.

2. OBJECTIVE OF THE PROJECT

2.1) Core Objectives:

- **Automate Attendance Tracking:**
 1. Replace manual attendance processes with a robust, contactless system.
 2. Eliminate potential errors and biases associated with manual attendance recording.
 3. Streamline attendance management for improved efficiency and time savings.
- **Improve Accuracy and Reliability:**
 1. Achieve accurate and consistent face detection and recognition under varying conditions.
 2. Mitigate challenges posed by lighting, angles, and partial occlusions.
 3. Ensure dependable attendance data for informed decision-making.
- **Enhance Security and Prevent Unauthorized Access:**
 1. Provide a secure authentication mechanism based on unique facial features.
 2. Restrict access to individuals who are enrolled in the system.
 3. Protect sensitive attendance data from unauthorized access.
- **Reduce Labor Costs and Administrative Burden:**
 1. Minimize manual work associated with attendance monitoring and record-keeping.
 2. Free up human resources for more productive tasks.
 3. Streamline administrative processes related to attendance management.
- **Collect and Analyze Attendance Data:**
 1. Gather comprehensive attendance records for individuals and groups.
 2. Generate reports to track attendance patterns, identify trends, and make informed decisions about resource allocation, scheduling, and performance management.

2.2) General Objective:

- Automate attendance with reliable face recognition (Haarcascade + LBPH).
- Increase accuracy and security compared to manual methods.
- Save time and reduce administrative burden.
- Analyze attendance data and gain valuable insights.
- Optionally: integrate with existing systems and explore advanced features.

3.INTRODUCTION

In this project, we explore the development of a reliable and efficient face recognition and attendance system. It leverages Python's powerful libraries for image processing, data management, and user interface, along with effective face detection and recognition algorithms.

3.1) Key Components:

1. **Python:** A versatile programming language well-suited for image processing and data analysis tasks.
2. **CSV (Comma-Separated Values):** A simple and widely used file format for storing attendance records in a structured manner.
3. **Haarcascade Classifier:** A robust machine learning-based method for face detection within images.
4. **LBPH (Local Binary Patterns Histograms) Face Recognition:** An efficient algorithm that extracts facial features to compare and recognize faces with high accuracy.

3.2) Project Objectives:

1. Develop a system that accurately identifies and recognizes individuals using facial features.
2. Automate the attendance marking process, eliminating manual errors and saving time.
3. Provide a user-friendly interface for registration, attendance tracking, and management.
4. Store attendance data securely and efficiently in CSV format for easy access and analysis.

3.3) Project Structure:

1. User Registration:

4. Capture multiple images of each user for effective training.
5. Store images and corresponding personal information (names, IDs) in a database.

2. Face Detection:

- Employee/Student the Haarcascade classifier to accurately locate faces within captured images or video streams.

3. Face Recognition:

- Implement the LBPH algorithm to extract and compare facial features with the registered database.
- Identify individuals with high confidence.

4. Attendance Marking:

- Record attendance for recognized individuals in a CSV file, including timestamps and relevant details.

5. User Interface:

- Design a user-friendly interface using Python's GUI libraries for seamless interaction and management.

3.4) Benefits:

- **Accuracy:** Face recognition technology offers high accuracy in identifying individuals.
- **Efficiency:** Automates attendance processes, saving time and resources.
- **Security:** Reduces potential for attendance fraud or errors.
- **Convenience:** Eliminates manual attendance procedures.
- **Data Management:** Stores attendance records securely and enables easy analysis.
- **Cost-Effective:** Leverages open-source libraries and technologies.

4. FUTURE PLANS

1. Performance Optimization:

- Real-Time Performance: Improve processing speed for real-time face recognition and attendance marking, even in crowded environments.
- Database Handling: Optimize data storage and retrieval for large-scale databases to ensure efficient system operation.

2. Enhanced Features:

- Multi-Camera Support: Incorporate the ability to handle multiple camera inputs for wider coverage and flexibility.
- Attendance Analytics: Develop features for comprehensive attendance analysis, including generating reports, identifying patterns, and tracking trends.
- Integration with Other Systems: Explore integration with existing systems, such as student information systems or payroll systems, to streamline processes and data management.
- Cloud Deployment: Consider cloud-based deployment for scalability, remote access, and easier maintenance.

3. Security and Privacy:

- Data Protection: Implement robust security measures to protect sensitive attendance data and ensure user privacy.
- Consent and Transparency: Establish clear guidelines for data collection, usage, and access, adhering to ethical and privacy regulations.

4. User Experience:

- Mobile Access: Develop a mobile app for attendance management and viewing attendance records on the go.
- Intuitive Interface: Design a user-friendly interface with clear visual feedback and guidance.
- Accessibility Features: Incorporate accessibility features for users with different abilities.

5. Hardware Optimization:

- Explore Hardware Acceleration: Investigate the use of specialized hardware, such as GPUs or dedicated face recognition devices, to accelerate processing and optimize performance.

6. Continuous Improvement:

- Regular Updates: Stay updated with advancements in face recognition technology and incorporate improvements as they become available.
- User Feedback: Gather and incorporate user feedback to refine features and enhance usability.

5.LEARNING FROM THE PROJECT

- **Technical Learnings:**

1. **Python Libraries:**

- ❖ Gained proficiency in using essential Python libraries for image processing (OpenCV), data handling (CSV, pandas), and user interface development (tkinter).
- ❖ Developed practical experience in integrating these libraries for real-world applications.

2. **Face Detection and Recognition:**

- ❖ Understood the principles and implementation of the Haarcascade classifier for efficient face detection.
- ❖ Applied the LBPH algorithm for face recognition, learning its strengths and limitations.
- ❖ Explored challenges and potential solutions related to lighting variations, facial expressions, and occlusions.

3. **Database Management:**

- ❖ Experienced working with CSV files for storing and managing attendance records.
- ❖ Appreciated the need for efficient database handling for large-scale systems.

- **Project Management:**

1. **Planning and Execution:**

- ❖ Enhanced skills in breaking down a project into manageable tasks and setting realistic timelines.
- ❖ Practiced problem-solving and debugging techniques to overcome challenges encountered during development.

2. **Testing and Evaluation:**

- ❖ Conducted comprehensive testing to assess system accuracy and efficiency.
- ❖ Gathered user feedback to identify areas for improvement.

- **Algorithm Understanding:**

1. **Haarcascade Classifier:**

- ❖ Gained insights into how this machine learning-based method detects faces using trained features.

- ❖ Learned to train classifiers for different facial features.

2. LBPH Algorithm:

- ❖ Comprehended the concept of local binary patterns and their use for facial feature representation.
- ❖ Experienced the trade-offs between accuracy and computational efficiency in face recognition algorithms.

- **Specific Learning Outcomes:**

1. Data Collection and Preprocessing:

- ❖ Learned the importance of high-quality training data for accurate face recognition.
- ❖ Applied techniques for image resizing, cropping, and grayscale conversion.

2. Model Training:

- ❖ Understood the process of training a face recognition model using labeled images.
- ❖ Experimented with different parameters to optimize model performance.

3. Attendance Marking:

- ❖ Implemented logic to record attendance based on recognized faces.
- ❖ Used CSV files for data storage and retrieval.

4. User Interface Design:

- ❖ Created a user-friendly interface for registration, attendance tracking, and system management.
- ❖ Incorporated real-time feedback and guidance for users.

6.SUGGESTIONS

- **Enhance features:**

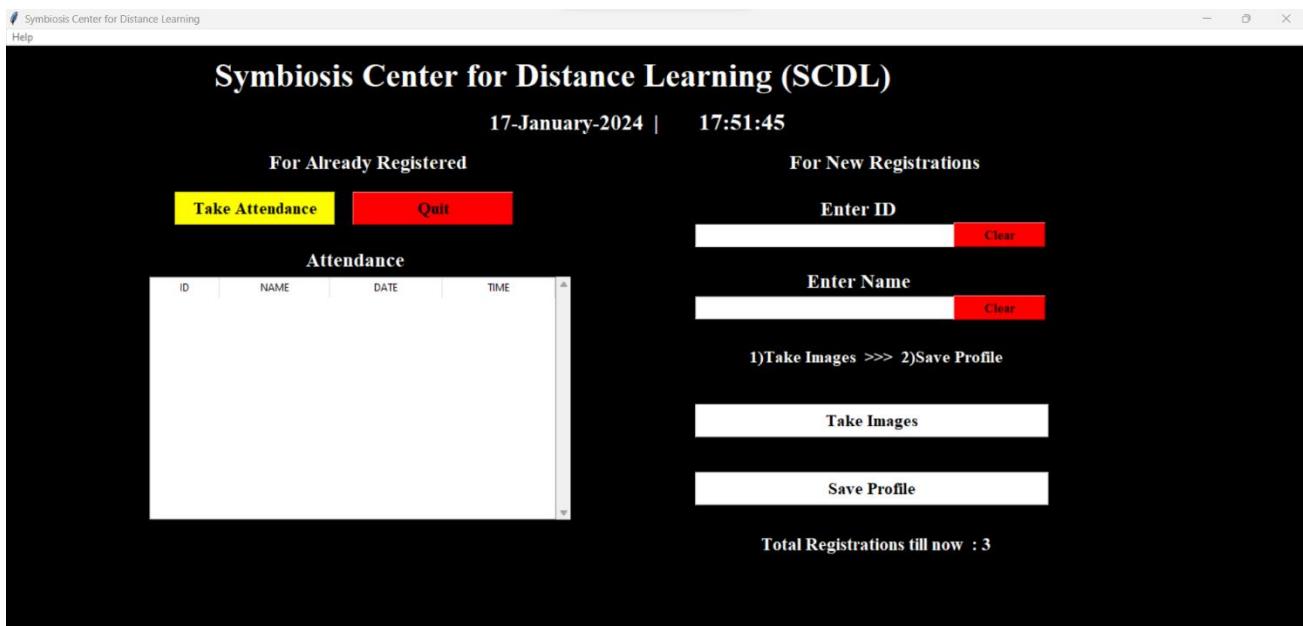
- ❖ **Multi-camera support:** Expand the system to handle multiple cameras for wider coverage in larger areas.
- ❖ **Role-based access control:** Implement different access levels for users, like administrators managing settings and teachers checking attendance for specific classes.
- ❖ **Integration with existing systems:** Integrate the system with existing student databases or access control systems for seamless data exchange and automation.
- ❖ **Performance optimization:** Optimize the system for real-time performance, especially face detection and recognition processes, to minimize processing delays.

- **Improve user experience:**

- ❖ **Web interface:** Consider developing a web interface for easier access and administration, accessible from any device.
- ❖ **Mobile app:** Create a mobile app for students to track their attendance records and receive notifications.
- ❖ **Voice commands:** Add voice control options for hands-free operation, especially during registration or attendance marking.
- ❖ **Progress reports:** Generate personalized attendance reports for students and teachers, with visualizations and insights.

7.ANNEXURE

1) Home Page



2) Student Detail

The screenshot shows an Excel spreadsheet titled "StudentDetails - Excel". The table has columns labeled A through M. The data is as follows:

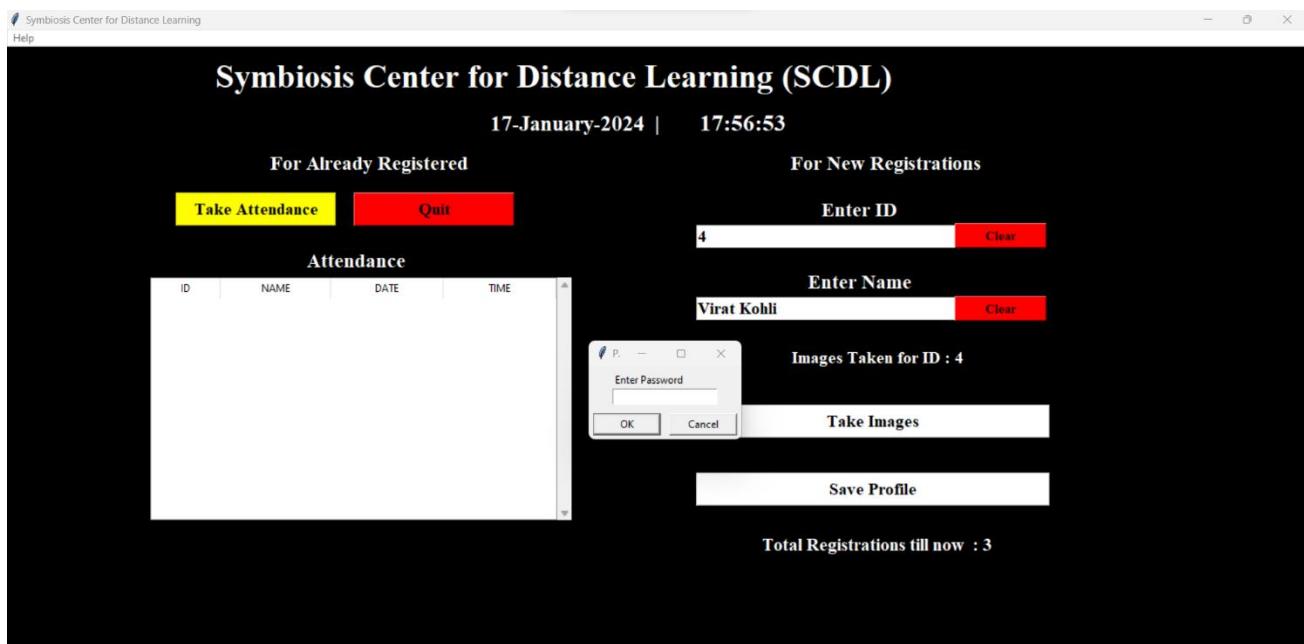
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SERIAL NO.	ID		NAME									
2	0		0	qw									
3	1		1	Mayur Borse									
4	2		2	Anushka Patil									
5	3		3	Ritesh Kinge									
6													
7													
8													

3) Attendance

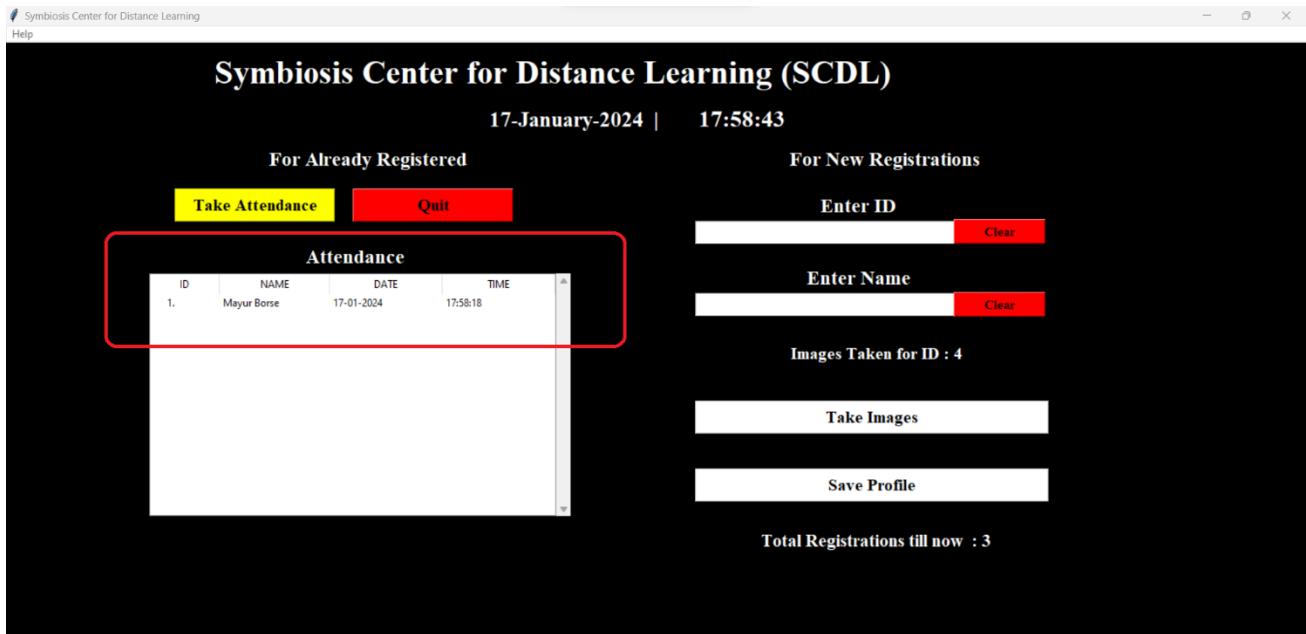
A screenshot of a Microsoft Excel spreadsheet titled "Attendance_14-01-2024 - Excel". The spreadsheet has a header row with columns for Id, Name, Date, and Time. Data rows 3, 5, and 7 contain entries for Anushka Patil, Mayur Borse, and Ritesh Kinge respectively, with their respective dates and times.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Id		Name		Date		Time						
2													
3	2		Anushka Patil		14-01-2024		21:13:55						
4													
5	1		Mayur Borse		14-01-2024		21:18:49						
6													
7	3		Ritesh Kinge		14-01-2024		21:13:55						
8													
9													
10													
11													

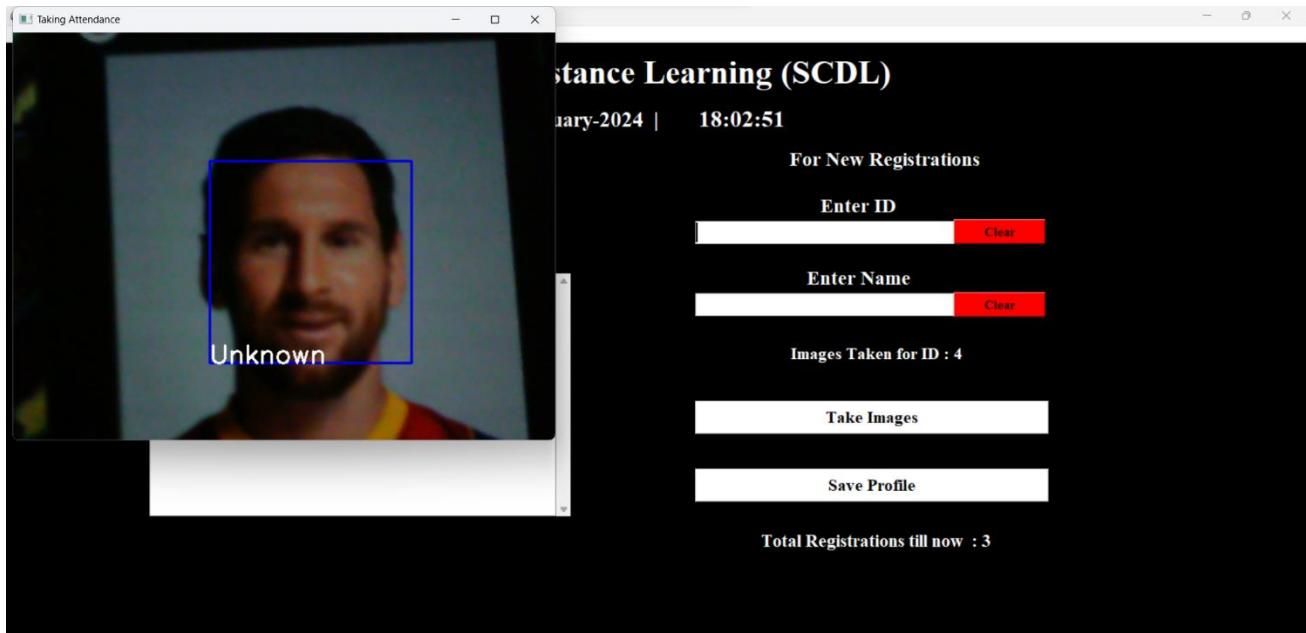
4) Security



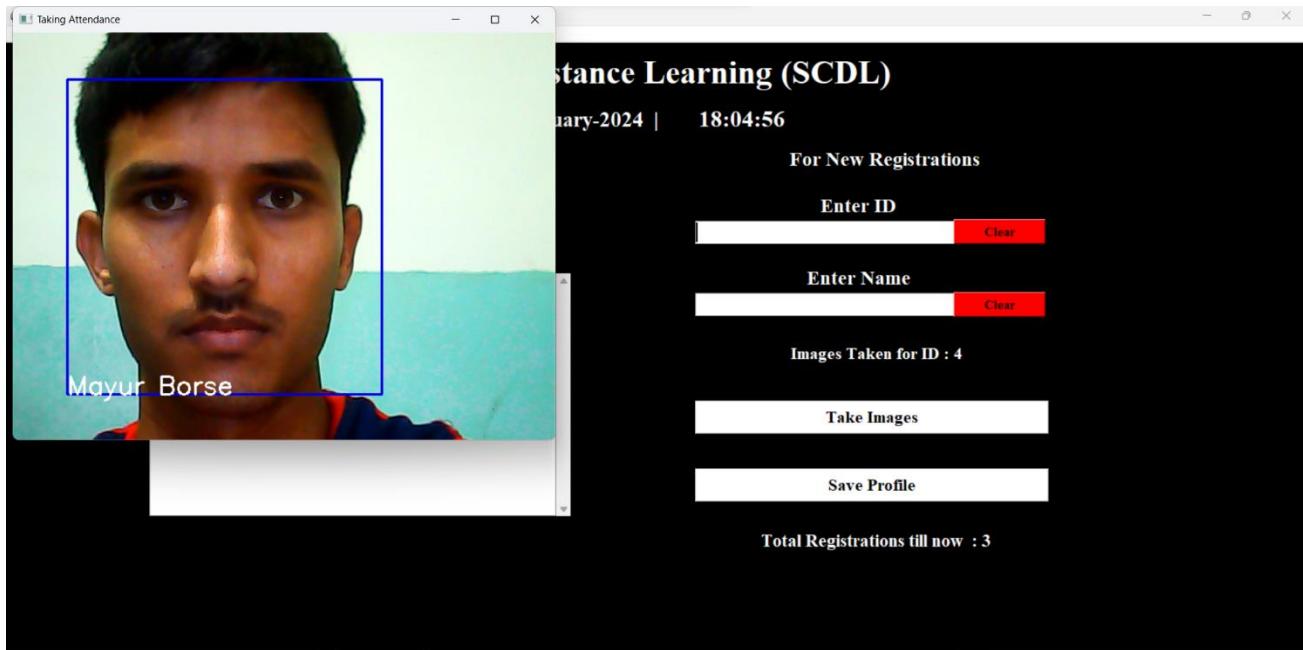
5) Display Attendance



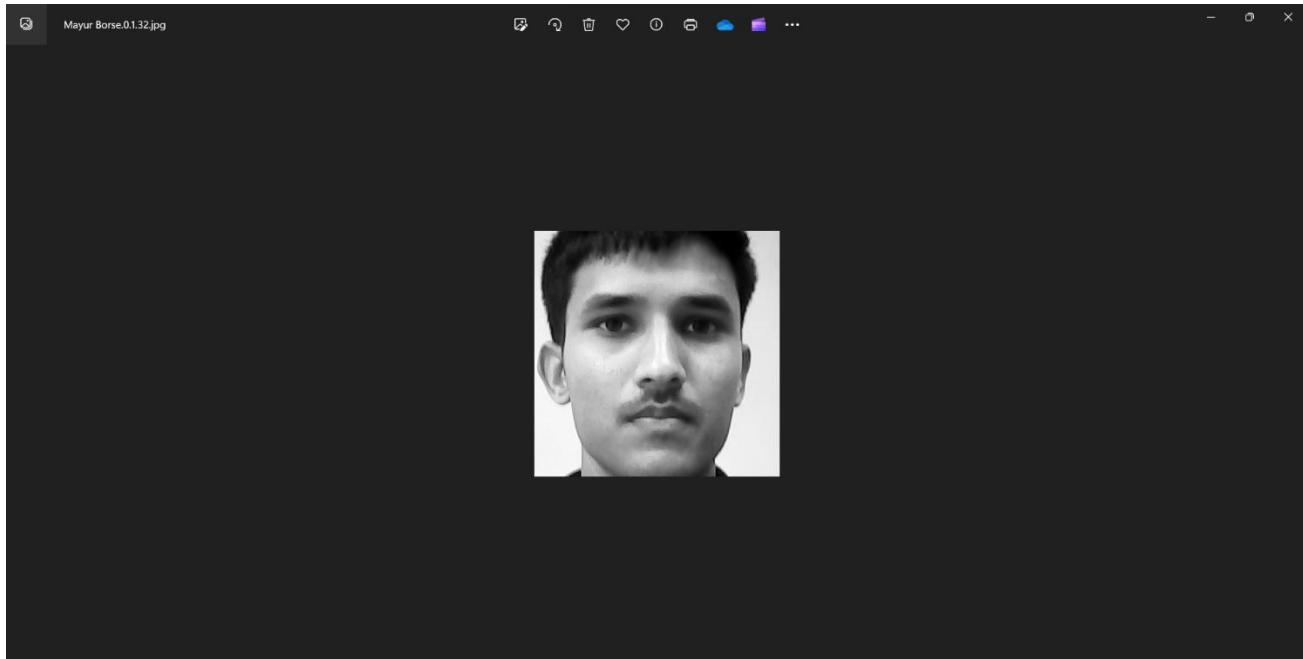
6) Unknown Detect



7) Known Detect



8) Trained Image



8.WEEKLY REPORTS

- **Objectives:**

- ❖ Complete the user interface for the system.
- ❖ Implement functionalities for new student registration.
- ❖ Integrate image capture and storage modules.
- ❖ Develop algorithms for face detection and identification.

- **Planned Activities for Next Week:**

- ❖ Focus on training the face recognition model using captured images and student information.
- ❖ Develop algorithms for attendance recording and data management in CSV files.
- ❖ Design and implement functionalities for reporting and analyzing attendance data.
- ❖ Conduct internal testing to evaluate system performance and identify potential bugs.

9. FACULTY AND STUDENT FEEDBACK

- ❖ The project is good, something is different by this group and their work is excellent, their project is solving some real-world problem. The project is working very smoothly.

-Pratik Dange(student)

- ❖ The project is very excellent. The project is working is very good. Team explanation is Good.

-Tasarif Pathan(student)

- ❖ The Project is very Good, Model is also good. Team efforts are shown very well in this project. this project can change many of small school problems of biometric attendance.

-Saurav tejam (student)