International Scientific Journal of Engineering and Management (ISJEM) ISSN: 2583-6129
Volume: 04 Issue: 06 | June – 2025 DOI: 10.55041/ISJEM04112
An International Scholarly || Multidisciplinary || Open Access || Indexing in all major Database & Metadata

"Biometric Attendance Monitoring Using Iris Recognition Technology"

Saurabh Namdev Khaire, Dr. Amit. Bhusari

1Saurabh khaire Master of Computer Application & Trinity Academy of Engineering, Pune
2 Dr.Amit. Bhusari Master of Computer Application & Trinity Academy of Engineering, Pune

---

Abstract - In modern institutions and organizations, ensuring accurate and secure attendance tracking remains a significant challenge. Traditional methods such as manual roll calls or card-based systems are often prone to errors, fraud, and inefficiencies. Biometric-based attendance monitoring system utilizing iris recognition technology, offering a secure, non-invasive, and highly accurate solution biometric attendance monitoring system based on iris recognition technology. The proposed system offers a secure, efficient, and contactless method of recording attendance, overcoming the limitations of traditional methods such as manual entry and RFID cards. By utilizing the uniqueness and stability of the human iris, the system ensures high accuracy and resistance to spoofing. The research discusses the design, development, and performance evaluation of the system, incorporating image processing and pattern recognition algorithms. Experimental results demonstrate the system's effectiveness in real-world conditions, highlighting its potential for applications in educational institutions, corporate offices, and secure facilities. The proposed system captures and verifies the unique iris patterns of individuals to record attendance in real-time. Leveraging image processing and pattern recognition algorithms, the system ensures high matching accuracy while mitigating the risk of impersonation.

***Key Words*:** Biometric authentication, Iris recognition, Attendance system, Image processing, Pattern recognition, Security, Automation.

1.INTRODUCTION

Attendance monitoring plays a vital role in educational institutions and corporate environments. Traditional systems, including manual logging and RFID card swiping, are susceptible to proxy attendance and human error. Biometrics, which uses unique physiological characteristics for identification, offers an effective solution. Among various biometric modalities, iris recognition stands out due to its high uniqueness, stability over time, and resistance to spoofing. This paper introduces an automated attendance system based on iris recognition to enhance security, accuracy, and efficiency. Traditional attendance systems are prone to inaccuracies, proxy attendance, and inefficiencies. Biometric technologies offer a solution by using unique physiological characteristics. Among these, iris recognition stands out due to its high reliability and non-intrusive nature.

2. Methodology

2.1 Data Collection

Images were collected from volunteers under controlled lighting conditions. The data collection process is a crucial part of building and evaluating an effective iris recognition-based attendance system. This section outlines the sources, procedures, and considerations involved in gathering and preparing iris image data for training and testing the system.

2.2 Iris Segmentation

Localization of the iris region from the eye image. Circular Hough Transform is used to detect the boundaries of the pupil and iris.Eyelids, eyelashes, and reflections are masked to isolate the iris.Only the valid iris region is passed on for further processing.

.2.3 Normalization

Mapping of the iris into a fixed dimension for consistent matching. The segmented circular iris region is converted to a rectangular format using Daugman's Rubber Sheet Model.This step standardizes iris images of different individuals for uniform feature extraction.

2.4 Matching and Identification

Hamming Distance – For traditional binary codes.

Cosine Similarity or Euclidean Distance – For deep learning feature vectors. Verifying identity and recording attendance in real-time.

2.5 Feature Encoding

Converting the normalized iris image into a binary code. Gabor filters or Log-Gabor filters are applied to extract phase and texture features from the normalized iris image. These features are encoded into a binary iris code.

2.6 Android 14 Permissions

Android 14's runtime permission model is implemented to ensure camera and storage access permissions are user-friendly and compliant.

3.Results and Discussion

The high accuracy and low error rates of the system demonstrate the feasibility of iris recognition for real-world attendance systems. Challenges include handling users with eye-related conditions and performance in

non-ideal environments, which can be mitigated through adaptive preprocessing and better camera hardware.

Table -1: Iris Recognition Models

Model	Accuracy (%)	FPS
Gabor Filters	94.2%	5 FPS
Simple CNN	96.8%	12 FPS
ResNet50	98.3%	9 FPS
MobileNet	95.1%	20 FPS

The detection accuracy improved with more complex models, but performance declined slightly. The threshold-based filter ensured users only viewed high-confidence detections. This balance of speed and precision enables real-world usability in educational tools, accessibility support, and lifestyle applications.

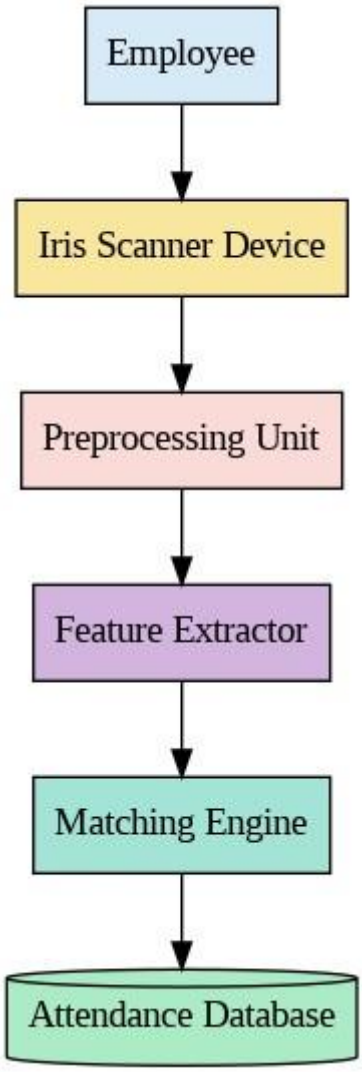

Fig -1: System Architecture Diagram

The proposed iris recognition-based attendance system is designed as a modular, efficient, and real-time biometric solution. It integrates hardware for data acquisition, software modules for image processing and recognition, and a backend for data storage and reporting.

The app detects two instances of a “remote” object in the image, with confidence scores of 0.71 and 0.76 respectively. A user-defined threshold value of 0.40 ensures that only detections above this confidence are displayed. The EfficientDet Lite0 model is used for inference, enabling accurate and efficient real-time object recognition. Detected objects are visually marked with bounding boxes and labeled confidence scores for clear user feedback.

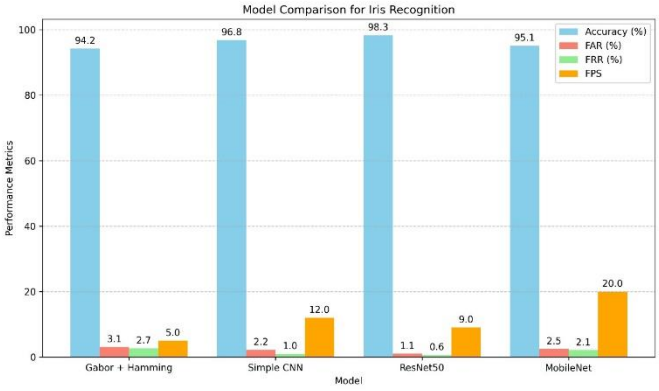

Fig -3: Model Comparison Chart

This chart evaluates four object detection model Gobar Harmming, Simple , CNN, and Res Net-based on classification accuracy (%) and frames per second (FPS). The left Y-axis represents accuracy, indicating model effectiveness in object detection, while the right Y-axis shows FPS, reflecting real-time inference speed. As illustrated, Gobar Harmming, offers the highest FPS, making it ideal for resource-constrained environments, but at the cost of lower accuracy. Conversely, EfficientNet-Lite2 achieves the highest accuracy but with reduced speed. This comparison underscores the trade-off between speed and precision, guiding model selection based on application requirements.

3. CONCLUSIONS

Design and implementation of a real-time biometric attendance monitoring system using iris recognition technology. The system successfully integrates image processing, iris feature extraction, and biometric matching to automate attendance recording in a secure, non-intrusive manner.. Iris recognition-based attendance system as a reliable, secure, and efficient solution to traditional attendance tracking problems. Future work will focus on expanding the system to mobile platforms and integrating anti-spoofing techniques to further enhance reliability.

ACKNOWLEDGEMENT

The author would like to thank **Trinity Academy of Engineering, Pune**, for the support and guidance in completing this major project.

REFERENCES

1.Daugman, J. (2004). *How iris recognition works*. IEEE Transactions on Circuits and Systems for Video Technology, 14(1), 21–30. https://doi.org/10.1109/TCSVT.2003.818349
2.CASIA Iris Image Database, Chinese Academy of Sciences – Institute of Automation (CASIA). Available at: http://www.cbsr.ia.ac.cn/english/IrisDatabase.asp
3. Kumar, A., & Passi, A. (2010). *Comparison and combination of iris matchers for reliable personal authentication*. Pattern Recognition, 43(3), 1016–1026. https://doi.org/10.1016/j.patcog.2009.09.017
4. Bowyer, K. W., Hollingsworth, K., & Flynn, P. J. (2008). *A survey of iris biometrics research: 2008 update*. Computer Vision and Image Understanding, 110(2), 281–307.
5. Jain, A. K., Ross, A., & Prabhakar, S. (2004). *An introduction to biometric recognition*. IEEE Transactions on Circuits and Systems for Video Technology, 14(1), 4–20.
6. TensorFlow Lite, "TensorFlow Lite," *TensorFlow.org*. [Online]. Available: https://www.tensorflow.org/lite. [Accessed: Jun. 3, 2025].

BIOGRAPHIES

Saurabh Khaire is a graduate student pursuing a Master of Computer Applications (MCA) degree at Trinity Academy of Engineering, Pune, India. His research interests encompass Android application development, machine learning, cloud computing, and DevOps. He possesses practical experience in the development and implementation of real-time mobile vision systems and automation frameworks. His work aims to contribute to the advancement of intelligent mobile computing through the application of deep learning techniques and cloud-based solutions.