Attendance Management System Using Mobile Biometric Technology

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Abstract: Attendance management systems have started to use portable biometric technology to improve their accuracy, efficiency, and security. This paper reviews the approaches and advancements in attendance management systems that use portable biometrics. It highlights the challenges faced by traditional attendance systems and stresses the need for more reliable solutions. It then explains various types of biometrics used in portable attendance systems, such as fingerprint, facial recognition, iris scanning, and voice recognition, along with their pros and cons. The paper also discusses how mobile devices, like smartphones and tablets, have been integrated into attendance systems, making attendance tracking more convenient and widespread. The review addresses security and privacy concerns associated with biometric data storage and transmission in mobile environments, and the regulations governing their implementation. Additionally, the paper examines recent developments in portable biometric technology, such as machine learning algorithms for better recognition accuracy and biometric integration methods for improved reliability. Finally, the review concludes with insights into future research directions and emerging trends in the field, including multimodal biometrics, wearable devices, and the integration of the Internet of Things (IoT) for comprehensive attendance management solutions. Overall, this study provides an in-depth overview of attendance management systems that use portable biometric technology, offering valuable insights to researchers, practitioners, and policymakers in the field.

Index Terms - Attendance management systems, Portable biometric technology, Mobile devices integration, Security and privacy concerns, Emerging trends.

I. INTRODUCTION

Fingerprint scanning is a form of biometric technology that is being used to replace traditional attendance management methods such as paper-based registers or swipe cards with more secure and efficient systems. Mobile biometric technology is one such advancement that is being used because of its accessibility, accuracy, and convenience. Mobile biometric technology uses smartphones or tablets to capture and verify biometric information through fingerprint scanning. Unlike stationary systems, mobile-based solutions offer flexibility, allowing users to record their attendance conveniently. This overview paper explores mobile biometric technology with a focus on fingerprint scanning in attendance management systems. It discusses the principles, challenges, and benefits associated with this innovative approach and its applications in various sectors such as education, healthcare, corporate offices, and government. By providing an overview of mobile biometric technology and its relevance to attendance management systems with a specific focus on fingerprint scanning, discussing the advantages of mobile-based solutions over traditional methods, analyzing the technical considerations and security implications of implementing mobile biometric fingerprint scanning systems, reviewing case studies and real-world examples, and identifying future trends and potential advancements in the field of mobile biometric technology for attendance management with a specific focus

on fingerprint scanning, this study paper aims to contribute to the understanding and adoption of innovative solutions in the domain of workforce management and beyond.

II. LITERATURE SURVEY

A. Fingerprint Identification Based [1]

Fingerprint or hand motion recognition is a highly effective method for attendance management systems. This involves comparing one or more unknown fingerprints to a database of known and unknown fingerprints. A specific fingerprint device is used in a fingerprint attendance system, where students can verify their identity by placing their fingertips on the sensor. However, the system may require additional verification since fingerprint scanners may not always recognize a fingerprint on the first try.

B. GPS Based [2]

The Global Positioning System (GPS) helps us know where people are and what direction they're heading in, anywhere in the world. Satellites are now used to find directions, replacing the need for objects in the sky. Kumar and Kumar [12] introduced a new system for tracking attendance and time using a location-based Android mobile app. This system reduces the need for extra biometric screening equipment. The GPS on mobile phones determines the location of each student, which is essential for keeping track of their attendance and time.

C. QR code Based [3]

A related standardized tag is a graphical representation of data that machines can read. A Quick Response Code, also known as a QR code, is similar to a barcode. However, it holds information in both horizontal and vertical directions due to its two-dimensional nature. As a result, a QR code can store much more information than a barcode. introduced a system for automating student attendance, where each individual has a unique ID assigned to a barcode that can be scanned by a mobile app. However, one of the downsides of this approach is that a student could trick the system by using the IDs of other students in the system. Another approach involves collecting attendance and updating data in one place. The proposed method, which was built using QR code technology and based on research, is a smart attendance system that speeds up the attendance process by creating and scanning QR codes. The system runs as an application on mobile devices and is built on QR technology. Additionally, to ensure student attendance in the course, suggest "an Android-based course attendance system using face recognition." The course information is encoded into a QR code and displayed at the front of the lesson. The student is only required to use their phone to take a photo of their face and display a QR code. The image is then transmitted to the server to manage attendance.

D. Digitalizing the Ancient Approach [4]

Traditional student attendance involves roll-call procedures that can waste a lot of time for both students and teachers during departmental sessions. This method involves instructors calling out each student's name in class and marking their attendance when the student responds. This process is time-consuming and can be shortened by using an online system. Mendonca et al. [20] developed an internet-based system that provides a faster and more straightforward way to monitor attendance. Instead of traditional paper-based attendance records, teachers can access the necessary data from the database, creating a paperless system. Another study utilized mobile devices in attendance management. They developed a mobile-based attendance management program for Android systems using VB.NET and SQL Server. The system has five components: admin, enrollment, student, SMS, and an Android component. Students can use the Android component to send messages to the system notifying teachers of their absence. Additionally, parents can receive SMS notifications about their student's behavior.

III. PROPOSED SYSTEM

The proposed system is an inbuilt mobile phone biometric-authenticated attendance system designed for educational institutions or organizations. It features a user-friendly interface accessible through a mobile view application. The system ensures accurate and secure attendance management using biometric authentication, specifically fingerprint recognition, integrated into the mobile device. Students and staff can mark their attendance using their registered fingerprints, ensuring accurate and secure authentication. The system includes a period timeline for marking attendance within the specified time frame of the session. This feature helps in maintaining discipline and punctuality. To prevent late attendance marking, the system has a session timeout feature. Once the session time expires, users will no longer be able to mark their attendance for that session. Users are required to connect to the same Wi-Fi network as the attendance system to mark their attendance. This ensures that attendance marking is done only within the premises of the institution or organization. The system includes an admin view where authorized personnel can view and manage attendance reports. This feature allows for easy monitoring and tracking of attendance records. The system is

accessible through a mobile application, providing a convenient way for users to mark their attendance using their mobile devices. The use of biometric authentication ensures accurate attendance recording, eliminating the possibility of proxy attendance. Biometric authentication enhances security, preventing unauthorized access to the attendance system. The mobile view application and user-friendly interface make the attendance marking process efficient and convenient for users. Admins can monitor attendance in real time, allowing for timely interventions if needed. Overall, the proposed system offers a comprehensive solution for attendance management, combining the convenience of mobile technology with the security of biometric authentication to ensure accurate and efficient attendance tracking.

IV.IMPLEMENTATION

Mobile Application:
Develop a mobile view application for both students and admins.

Biometric Authentication:
Integrate biometric authentication (e.g., fingerprint) into the mobile app for student verification.

Session Management:
Implement a session management system that defines the start and end times of each attendance session.

Wi-Fi Connectivity Check:
Include a feature in the app that checks whether the student's phone is connected to the designated Wi-Fi network.

Attendance Marking:
Allow students to mark their attendance within the session timeline using the mobile view application.

Admin View:
Create a separate interface for admins to view attendance reports and manage sessions.

Database:
Use a database to store attendance records and session information.

Security:
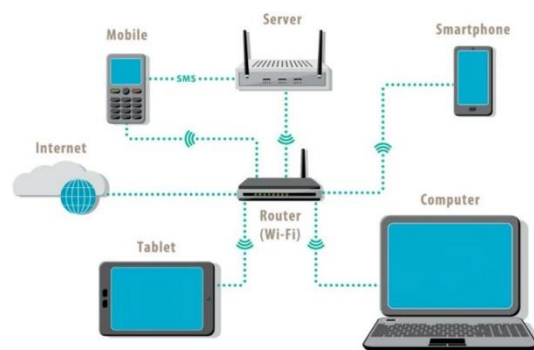Implement security measures to protect the system from unauthorized access and data breaches.

Fig 1: Implementation

V.RESULT :

This project aims to design and implement an attendance management system that combines mobile and web applications. The system utilizes fingerprint verification for student attendance and provides a web-based dashboard for administrative tasks. This innovative approach enhances the accuracy, security, and efficiency of recording attendance.
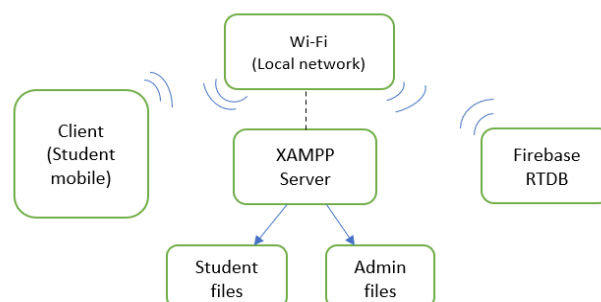

Fig 2: Overview

System Architecture:

The architecture comprises two main components: the client-side mobile application and the server-side Firebase database. The mobile app serves as the user interface for students, whereas Firebase handles data storage, retrieval, and authentication.

Admin Interface: Allows administrators to manage student profiles, and lecture schedules, and view attendance details.

Student Interface: Enables students to mark attendance through phone fingerprint verification.

Server Backend (Firebase):

Firebase Realtime Database: Stores all user data, including student details, attendance records, and lecture schedules.

Methodology:

User Registration and Login:

Administrators and students register on the platform by entering the requisite details. Post-registration, users log in to the app, where students use fingerprint authentication to access their profiles.

Attendance Marking:

Upon successful fingerprint verification, the app interfaces with the Firebase server to fetch the current lecture details and marks the student's attendance by updating the database in real time.

Data Management:

Administrators can add or modify lecture details and student information through their interface. Changes are synchronized across the platform instantaneously.

Attendance data can be retrieved by administrators for generating reports or for further analysis.

Security Features:

Fingerprint Verification: Ensures that attendance marking is secure and personalized, preventing fraudulent entries.
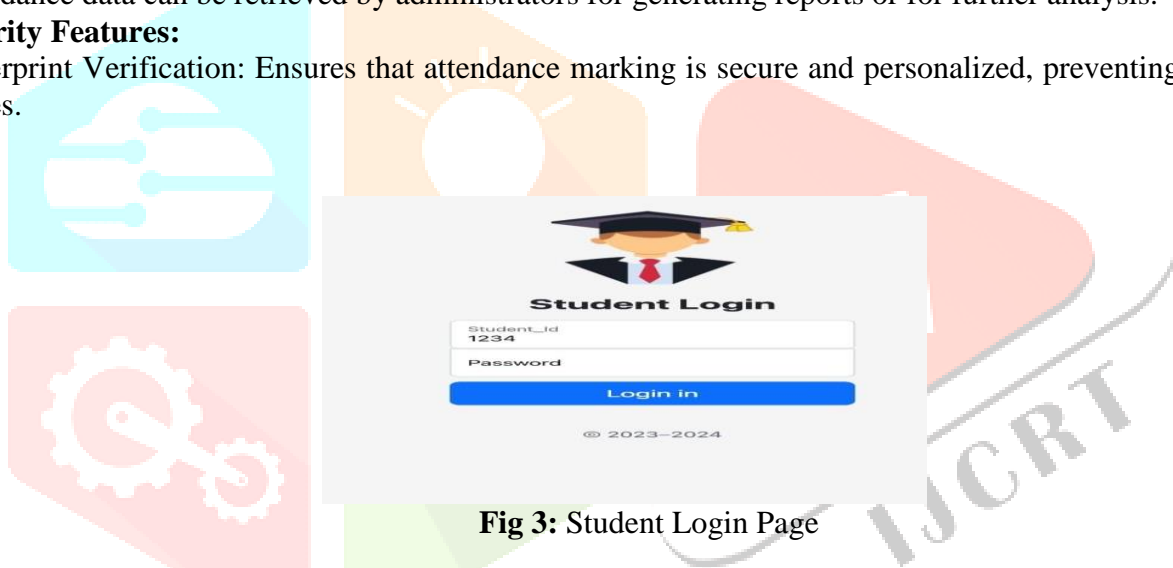

Fig 3: Student Login Page
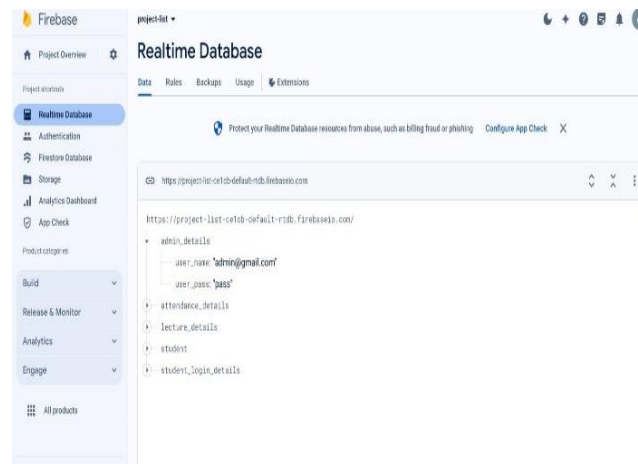

Fig 4: Attendance Marking Page

Fig 5: Realtime Database

CONCLUSION

Attendance tracking methods can be modernized by implementing a new biometric technology-driven system that uses nearby Wi-Fi. This system improves accuracy, efficiency, and security by using smartphones and biometric authentication. A reliable network is ensured, and external systems are not needed, making it more dependable. The system can be used beyond academic settings, including workplaces, events, and other organizational settings. This advancement in attendance management systems results in streamlined processes and improved user experiences.

REFERENCES

[1]. Design-Based Fingerprint Time Attendance System Using IOT With MCU Node ESP8266 Nesha Putri Pratama, Agung Triayudi, Deny Hidayatulloh.

[2]. Face recognition based attendance system using machine learning with location identification Naveen Raj M, R.Vadivel

[3]. Attendance Management System Using Fingerprint And Iris Biometric Abubakar Adamu Ibrahim Badamasi Babangida University

[4]. Students' Attendance Monitoring System with SMS Notification Jiwa Noris Hamid, University Technology MARA, Hawa Mohd Ekhsan, University Technology MARA, Fatheenursyaza Bakhri

[5]. Iot Biometric Attendance System Using Nodemcu MD. Minhajuddin, K. Surya Kiran, Y. Arun, Mrs. P. Kavitha.

[6]. A Literature Review on Smart Attendance Systems Bawar Ali Abdalkarim and Devrim Akgun

[7]. Sunaryono, J. Siswantoro, and R. Anggoro, "An Android Based Course Attendance System using Face Recognition," J. King Saud Univ. - Comput. Inf. Sci., vol. 33, no. 3, pp. 304–312, 2021, doi: 10.1016/j.jksuci.2019.01.006.

[8]. H. Sutar, S. Chaudhari, P. Bhopi, and D. Sonavale, "Automated Attendance System," Int. Res. J. Mod. Eng. Technol. Sci., vol. 04, no. 04, 2022.

[9]. Y. N. S, A. Kumar, and N. R. Kumar, "Location Based Smart Attendance System Using GPS," Ann.   Rom.   Soc. Cell Biol.,   vol.   25,   no. 2, pp.   4510–4516, 2021, [Online]. Available: http://annalsofrscb.ro

[10]. B. Chandramouli, S. A. Kumar, C. V. Lakshmi, G. B. Harish, and P. A. Khan, "Face Recognition Based Attendance System Using Jetson Nano," Int. Res. J. Mod. Eng. Technol. Sci., vol. 3, no. 8, 2021.