

ATTENDANCE TRACKER

PROJECT SYNOPSIS
SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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CANDIDATE'S DECLARATION

I hereby declare that the Synopsis Report which is being presented in the project entitled **ATTENDANCE TRACKER** in fulfillment of requirements for the award of degree of B.Tech. in CSE, submitted in the Department of Computer Science & Engineering at MEGHNAD SAHA INSTITUTE OF TECHNOLOGY under WEST BENGAL UNIVERSITY OF TECHNOLOGY, KOLKATA is an authentic record of our own work carried out during Odd Semester 2021-22 under the supervision of **MR. SHATANIK CHAKRABORTY**. The matter presented in this project has not been submitted by us in any other University / Institute for any award.

Signature of the Students
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CERTIFICATE OF APPROVAL

The foregoing project entitled **ATTENDANCE TRACKER** is hereby approved as a creditable study of an engineering subject carried out and presented in a manner satisfactory to warrant its acceptance as prerequisite for the degree for which it has been submitted. It is to be understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the thesis only for the purpose for which it has been submitted.

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1. INTRODUCTION

In today's digital age, traditional attendance methods are often time-consuming and prone to inaccuracies. Traditional attendance systems, such as manual roll calls, biometric devices, and QR code-based methods, often fall short due to issues like manipulation, human error, and lack of real-time verification. The proposed project ATTENDANCE TRACKER aims to streamline the attendance process by developing a user-friendly web application using geofencing technology and real-time location tracking. This system ensures that attendance can only be marked by users who are physically present within a predefined geographical boundary. The solution enhances security and eliminates the possibility of proxy attendance while automating the record-keeping process. Students can conveniently mark their attendance with a simple tap, eliminating the need for manual roll calls and reducing administrative burdens.

1.1.Purpose

The goal of this project is to provide a reliable attendance system that uses real-time geographic verification to reduce proxy attendance. To make sure that only authorized users can record their attendance from a predetermined place, the system makes use of GPS and position-tracking technology.

1.2. Domain Definition

The system is related to geofencing, attendance control, and real-time tracking. For safe attendance tracking, it combines software with hardware, such as GPS modules or smartphones

1.3. Motivation

Conventional attendance systems are prone to manipulation, leading to inaccuracies and inefficiencies. This project is motivated by the need for a reliable, tamper-proof solution to eliminate proxy attendance, enhancing accountability in educational institutions and workplaces

2. PRELIMINARIES

2.1 Attendance Management Systems

Traditional attendance systems rely on manual or biometric input, susceptible to errors or misuse. Geolocation-based systems eliminate the risk of proxy attendance by verifying the user's presence at predefined locations.

Advantages:

- Automates the attendance process.
- Provides a tamper-proof solution.
- Enables secure data storage and easy retrieval.

2.2 Existing Attendance Systems

Existing attendance systems include manual, biometric, and QR code-based approaches. These methods, while functional, often face challenges:

Manual Systems: Prone to human errors and fraud.

Biometric Systems: Susceptible to tampering and high implementation costs.

QR Code Systems: Vulnerable to duplication and lack real-time verification

2.3. Geofencing Technology

Geofencing creates virtual boundaries around specific locations, enabling actions triggered by a device entering or leaving the defined area. This system uses GPS or RFID technology to define boundaries. The attendance system leverages geofencing to ensure that users can only mark attendance when physically present at a specific location, such as a classroom or office.

Recent studies show significant advancements in geolocation-based systems. Geofencing and real-time tracking have proven effective in improving attendance accuracy while reducing fraud.

Key concepts:

Virtual Boundaries: Define geographical coordinates for permitted areas.

Trigger Mechanisms: Notifications or actions based on location entry or exit.

Challenges and Limitations

Despite their advantages, geolocation-based systems face challenges:

- **Battery Drain:** Continuous GPS usage can reduce device battery life.
- **Privacy Concerns:** Users may resist systems that track their location.
- **Signal Dependence:** Requires strong GPS or network signals for accuracy.

Proposed Solution

To address these limitations, the system integrates:

- **Efficient Algorithms:** Reduce power consumption by optimizing location tracking intervals.
- **Privacy Measures:** Use encrypted data transmission and ensure that location data is not stored beyond attendance verification.
- **Hybrid Systems:** Combine GPS with Wi-Fi and mobile networks to improve accuracy and reliability.

2.3.1. Real-Time Location Services

Real-Time Location Services (RTLS) provide continuous tracking of devices to determine their physical locations. Using GPS, Wi-Fi triangulation, and mobile network signals, the system ensures real-time verification of a user's presence.

Components:

- **Global Positioning System (GPS):** Primary method for location tracking.
- **Assisted GPS (A-GPS):** Faster and more reliable location fixes using cellular towers.
- **Accuracy Management:** Handling scenarios like weak signals or indoor environments.

2.4. External Application Tool Requirement

2.4.1. Hardware Tools

- **Smartphones:** Essential for users to interact with the system and enable location tracking.
- **Servers:** Used for storing attendance logs, user information, and location data.
- **Wi-fi Access Points:** Enhance location accuracy in indoor environments.

2.4.2. Software Tools

- **Backend Programming:** Languages such as Expressjs and Nodejs for implementing business logic.
- **Databases:** MongoDB for storing data securely.
- **Location APIs:** Google MapsAPI for integrating geolocation capabilities.

3. SYSTEM LITERATURE REVIEW

Paper-1 IMPLEMENTING QR CODE AND GEOLOCATION TECHNOLOGIES FOR THE STUDENT ATTENDANCE SYSTEM

AUTHORS- Taju, S. W., Mamahit, Y. P., & Pongantung, J. A. (2024). Implementing QR code and Geolocation Technologies for the Student Attendance System. *CogITO Smart Journal*, 10(1), 221–232.

This research successfully implemented an innovative student attendance system at Klabat University using a QRcode and geolocation technology. The attendance system has been enhanced through the integration of QR-Code and geo-location technologies, allowing for more effective recording, monitoring, and processing of student attendance. By implementing the latest QR-Code and Geo-Location features, this system has significantly improved the management and oversight of student attendance at Klabat University. This successful implementation demonstrates the potential for this system to be a model for similar applications in other educational institutions.

Paper-2 APPLICATION OF GEOLOCATION METHODS IN STUDENT ATTENDANCE SYSTEM DESIGN

AUTHORS- A. Siswanto and Y.Z. Pratama,"Application of Geolocation Methods in Student Attendance System Design", Data Science Insights, vol. 2, no. 1, pp. 1-8, 2024

The following can be concluded based on the analysis of the Student Attendance System using the Geolocation Method. The Student Attendance System using the Geolocation Method can run on the Android platform and website, the attendance process can run as expected on the Android application, the Geolocation method has been successfully implemented in the student attendance system, security to overcome fake GPS has been able to function properly, and the use of fingerprints to take attendance can be achieved. Running properly, from the results of Black box testing, the system can run well and is free from syntax and functional errors. In future research, it is hoped that applications can be developed on the iPhone device platform.

Paper-3 A MOBILE WEB APPLICATION FOR ATTENDANCE MANAGEMENT USING GEOLOCATION

AUTHORS- Lala O. G. , Aworinde H. O. , Ogunbanwo A. D. , Oduwole O. A., Adepegba O. A. and Onamade A. A.

The system has proven to be easier, faster, and more efficient than the previous attendance management system as it has improved attendance taking for students as well as attendance recording for lecturers. However, it can be improved upon by perfecting the geolocation feature used by the app and adding stricter security features to improve its reliability and accuracy.

Paper-4 MOBILE BASED STUDENT ATTENDANCE SYSTEM USING GEO-FENCING WITH TIMING AND FACE RECOGNITION

AUTHORS- Babatunde, A.N., Oke, A.A., Babatunde, R.S, Ibitoye, O. & Jimoh, E.R.

Automated Attendance System has been envisioned for the purpose of reducing the errors that occur in the traditional attendance taking system. The aim is to automate and make a system that is useful to the organization such as an institute. The efficient and accurate method of attendance

in the office environment that can replace the old manual methods. This In the course of developing this system the android based mobile application for students" attendance at a university. In this study we developed a mobile application for taking students attendance at Kwara State University, Malete. The developed application has been proven to solve the problem of manually taking attendance and proposes to integrate keying in the attendance in the CMS portal after each class. There are several improvements that can be suggested in enhancing the mobile applications. The attendance application can be improved by providing the notification from the lecturers to the administrator. This could be implemented upon further research development of the system for the administrator. Attendance App can also be improved by the graphical user interface by incorporating more icons, colors and menus. Furthermore, the attendance application can be improved by adding the function to alert the lecturers like notification in a smartphone status bar or setting alarm sound if the lecturer forgot to key in students" attendance. Although, the number of recorded sentences in the firebase database is limited the system was developed using android studio integrated development environment (IDE) which involves the use of XML for the frontend design and the Java programming language for the backend design.

Paper-5 IMPLEMENTATION OF MOBILE ATTENDANCE APPLICATION USING GEO-FENCE TECHNIQUE

AUTHORS- M. Makhtar, R. Rosly, S. A. Fadzli, S. N. W. Shamsuddin and A. A. Jamal

The Mobile Attendance System (MAS) developed consists of an Android smart phone, GPS technology, Wi-Fi access point and a server. The function of the entire system is very simple. It involves the GPS receiver embedded in a smart phone to get staff location and automate the clock in and clock out attendance in real time by touching a button on the phone. The IMEI number and GPS information for the smart phone is transferred to a database. The system is a possible option for replacing the current attendance methods. From the implementation, the system has successfully tested in real situation outside the building. It helps the process of taking staff attendance efficiently and cost effective when the user is away from office or outstation. MAS is a must-have application for those staffs that value every minute of their working time. The future scope of the app is to develop for other phones as well such as Symbian, Blackberry, and IOS.

4. CONCLUSION

The Attendance System for Zero Proxy Using Geographical Location offers a transformative approach to attendance management. By leveraging advanced technologies like geofencing and real-time location tracking, this system ensures:

- **Enhanced Integrity:** Eliminates the possibility of proxy attendance.
- **Automation:** Reduces the administrative burden of manual record-keeping.
- **Scalability:** Can be implemented in educational institutions, workplaces, and large events.
- **Security:** Utilizes encryption and secure protocols to safeguard sensitive data.

This solution not only addresses the limitations of existing systems but also aligns with modern technological trends. It has the potential to set a benchmark for secure, reliable, and efficient attendance management.

REFERENCES

- [1] Taju, S. W., Mamahit, Y. P., & Pongantung, J. A. (2024). Implementing QR code and Geolocation Technologies for the Student Attendance System. *CogITO Smart Journal*, 10(1), 221–232
- [2] A. Siswanto and Y.Z. Pratama, "Application of Geolocation Methods in Student Attendance System Design", *Data Science Insights*, vol. 2, no. 1, pp. 1-8, 2024.
- [3] M. Makhtar, R. Rosly, S. A. Fadzli, S. N. W. Shamsuddin and A. A. Jamal
- [4] Bhuiyan, M. Z. A., & Hong, C. S. (2020). "An Efficient Location-Based Attendance Tracking System with High Accuracy." *International Conference on Ubiquitous Information Management and Communication (IMCOM)*.
- [5] Hossain, M., & Akhtaruzzaman, M. (2018). "GPS-Based Location Tracking and Attendance Management System for Academic Institutions." *International Journal of Computer Science and Mobile Applications*, 6, 23-29.
- [6] Geeks for Geeks. (2022). *Introduction to Geofencing and Applications*.