

A Review on Geo-Location Based Attendance Management System

Ramlakhan Kumar Chauhan^{*1}, Ravi Prakash^{*2}, Shams Tabrej^{*3}, Shreya Singh^{*4}
^{*1,*2,*3,*4}Student of Institute of Technology and Management, Gida Sector-7, Gorakhpur

Abstract:- Attendance has long been an integral aspect of institutions and organizations, serving as a fundamental measure of engagement, participation, and accountability within educational and professional settings. In today's fast-paced world, where efficiency and accuracy are paramount, the traditional methods of manual attendance tracking have become increasingly inadequate. In response to these challenges, automated attendance systems have emerged as a promising alternative, offering a range of benefits such as real-time data capture, reduced administrative burden, and enhanced data integrity. However, despite the advancements in technology, many existing systems still grapple with issues related to scalability, accessibility, and cost-effectiveness. Our proposed solution seeks to address these shortcomings by harnessing the power of geolocation technology and mobile devices. By leveraging the ubiquity of smartphones and the precision of GPS, our system provides a seamless and efficient method for marking attendance, irrespective of the size or location of the institution.

Keywords:- Attendance Management, Geo-Location Technology, GPS.

I. INTRODUCTION

Attendance is commonly perceived as a straightforward process, yet it remains a mandatory requirement for every organization. For a considerable time, two main types of attendance systems have been in use: paper-based attendance systems and automated. The manual system relies on traditional tools such as pen, paper, and time sheets, often resulting in errors and inaccuracies. Typically, student attendance is recorded based on the number of lectures attended, with teachers dedicating significant class time to maintaining attendance records. Our proposed system utilizes a geolocation-based approach, leveraging mobile users' GPS coordinates to accurately determine student locations. This approach minimizes errors and enhances overall system accuracy. Furthermore, students have convenient access to their attendance records through a dedicated cross platform mobile application, providing transparency and accountability. By utilizing this geolocation technology and GPS connectivity, our system provides a strong and easy-to-use solution for updating attendance tracking in a contemporary and efficient manner.

II. LITERATURE SURVEY

Institutions of higher learning are worried about students' attendance consistency. Attendance is a significant problem in schools and colleges even in a pandemic condition. Calling out the roll call or having students sign a piece of paper are some traditional ways to record attendance. For the instructor to operate the class smoothly, attendance is a critical component of daily evaluation of the classroom. The instructor often checks attendance at the beginning and end of class, but with a manual approach, it may look that they missed someone or that some of the students answered more than once.

During our research for this project, we encountered several significant papers and articles that provided insights into the functionality and scope of our objectives. Here are some of the papers and their key points that we extracted from those papers we extensively studied- The paper titled "Modern Attendance System"[1] discussed in detail how Ultrasonic sensors and Wi-Fi Modules were utilized alongside GSM modem to leverage IoT technology for efficient message transmission and record maintenance. However, one drawback mentioned in the paper was the size and cost of the hardware components. The hardware, including Arduino, Ultrasonic sensors, and Wi-Fi Modules, was considered too bulky for bus entrance installation, leading to increased costs.

In the paper, "Wireless Fingerprint Attendance Management System"[2] Biometric recognition technology was utilized for marking attendance. Biometrics refers to measurable biological features that can be verified through automated means to confirm an individual's identity. This approach uses these traits to authenticate a person's identity and maintaining a biological record. During the authentication process, the user's biometric data is captured and the extracted features are compared with previously captured data stored in the database to determine a match. The accuracy of identification in a biometric system is evaluated using metrics such as the false acceptance rate and the false reject rate. The ratios of false acceptance rate to false rejection rate depend on various factors, including the complexity of the algorithms used in fingerprint extraction.

The research paper "Face Recognition Based Automated Attendance System" [3] utilizes advanced techniques like Deep Learning and Convolutional Neural Networks to recognize faces. These technologies help to speed up the system. Initially, surveillance cameras capture images of faces, which are then processed into frames. These frames are sent to a server for the detection and recognition of faces. Afterwards, an Excel sheet is created using specific methods, and weekly and monthly attendance reports are sent to parents and guardians. The system records attendance when a face matches the stored database. However, detecting and recognizing faces accurately can be challenging, especially if a student's appearance changes. If the camera doesn't capture a clear image of the face, the system may mark the student as absent. It's worth noting that this system is costly, and its accuracy isn't guaranteed.

The paper "Attendance Management System with RFID Technology" [4] talks about an application that makes it easy to keep track of attendance. It's designed for both teachers and administrators to record attendance, and there's also a section for students to check their own attendance. The system utilizes RFID technology to assign unique IDs to each student and staff member. When someone enters the campus, the admin database alerts the server and identifies the individual by checking against the stored database. One of the system's standout features is its ability to detect unauthorized users and inform the server accordingly. Attendance is recorded only when the GPS location and RFID unique ID match with the stored database. However, there are some limitations to the system. The application developed for this system is not compatible with multiple operating systems. Additionally, it doesn't provide a way for administrators to manually mark the attendance of students who forget to bring their RFID cards.

III. PROPOSED SYSTEM

This proposed system aims to streamline processes, minimize manual efforts, and reduce hardware costs, establishing a robust attendance management system. The conventional approach is replaced by a mobile application, diminishing reliance on pen and paper. Students are required to install the application on their mobile devices.

The block diagram below elucidates the comprehensive architecture. The Android application serves as the user interface accessible to teachers, students, and administrators. Each user must log in with appropriate credentials. The administrator's responsibilities encompass adding staff members, overseeing the system, and managing stored data. Teachers can view and modify attendance, while students can access their attendance records and statistical data. Every student is identifiable through a unique user ID, and their presence is determined using GPS coordinates, specifically longitudes and latitudes. To initiate this process, students must grant GPS access to the system and activate both GPS location and internet connectivity. The application checks GPS coordinates, and if they fall within the designated geofence boundary, attendance is logged. To store attendance records, the system uses the Firebase cloud system, which functions as a Backend Service. This method improves accuracy by enabling real-time storage in documents structured like JSON. Staff and administrators can access this stored data for continuous monitoring and analysis. Overall, the system offers precise tracking using GPS, reducing errors often seen with other biometric methods and environmental influences. The following flowchart diagram shows the workflow of this system.

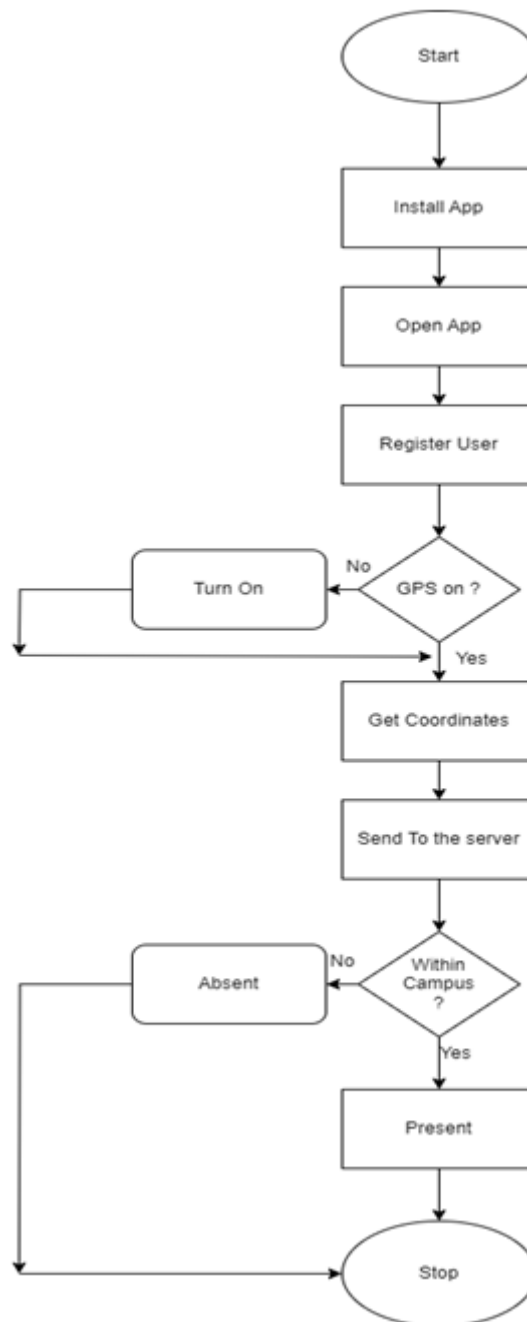


Fig 1 Flowchart of workflow

In our application, we have used GeoLocation API. Locations are extracted from the device with the help of the GPS module available. This location-based time and attendance tracking system operates by identifying your position and recording your login and logout times. Every staff member is authenticated using their unique user identification number. When a staff member enters the campus area, the option to mark attendance becomes enabled, allowing them to easily record their attendance status. Once again, when a staff member leaves the office area, the enabled option is automatically disabled. This means that the user cannot mark their presence outside of that designated area.

IV. CONCLUSION

In conclusion, the implementation of a geolocation-based attendance management system represents a significant advancement in streamlining processes, minimizing manual efforts, and reducing hardware costs. By replacing traditional methods with a mobile application, the system eliminates reliance on pen and paper, offering a more efficient and user-friendly solution for attendance tracking.

The comprehensive architecture, as illustrated in the block diagram, demonstrates the integration of various components to create a seamless user experience. The Android application serves as the interface for teachers, students, and administrators, facilitating access to attendance records and statistical data. Through unique user IDs and

GPS coordinates, the system accurately identifies and records students' presence within designated geofence boundaries. By leveraging the Firebase cloud system for real-time storage and access to attendance records, staff and administrators can efficiently monitor and analyze attendance data. This approach enhances accuracy and reliability, mitigating errors associated with traditional biometric methods and environmental factors.

Overall, the geolocation-based attendance management system offers a robust solution for educational institutions and organizations, enhancing efficiency, accuracy, and transparency in attendance tracking processes. With its user-friendly interface and advanced features, it sets a new standard for modern attendance management systems.

REFERENCES

- [1]. Prof. S. Y. Kanawade, Sonali Shinde, Kamini Matale, Manjusha Shelar. "MODERN ATTENDANCE SYSTEM", ISO 3297:2007 Certified Vol. 7, Issue 4, April 2018 Copyright to IJARCCCE DOI 10.17148/IJARCCCE.2018.
- [2]. Maddu Kamaraju, Penta Anil Kumar, "Wireless Fingerprint Attendance Management System", Electrical, Computer and Communication Technologies (ICECCT), 2015 IEEE International Conference, 5-7 March 2015.
- [3]. Nandhini R, Duraimurugan N, S.P. Chokkalingan "Face Recognition Based Attendance System" International Journal of Engineering and Advanced Technology (IJEAT) Volume-8, Issue-3S, February 2019
- [4]. M. B. Srinidhi and R. Roy, "A web enabled secured system for attendance monitoring and real time location tracking using Biometric and Radio Frequency Identification (RFID) technology," in Computer Communication and Informatics (ICCCI), 2015 International Conference on, 2015, pp. 1-5
- [5]. Shireesha Chintalapati, M.V. Raghunadh, "Automated Attendance Management System Based On Face Recognition Algorithms", Computational Intelligence and Computing Research (ICCIC), 2013 IEEE International Conference, 26-28 Dec. 2013.
- [6]. Shermin Sultana, Asma Enayet and Ishrat Jahan Mouri, "A smart, location based time and attendance tracking system using android application." in International Journal of Computer Science, Engineering and Information Technology (IJCSSEIT), Vol. 5, No.1, February 2015.
- [7]. Heeral Chauhan, Shubham Gokhale, Ekta Chhatbar, Sompurna Mukherjee and Nikhil Jha. "STUDENT ATTENDANCE MANAGEMENT SYSTEM", Paper ID: IJSRDV4I90357
- [8]. Prof. A. D. Sawant, Arti Dongare, Ichha Gilbale, Amit Singh Thakur, Pooja Tekawade "A Survey on Smart Attendance System Based on Various Technologies", International Journal of Innovative Research in Computer and Communication Engineering, pp 5-7, Vol. 5, Issue 10, October 2017.
- [9]. Freya. J. Vora, Pooja. L. Yadav, Rhea. P. Rai, Nikita. M. Yadav "Android Based Mobile Attendance System", International Journal of Advanced Research in Computer Science and Software Engineering, pp 1-2, Volume 6, Issue 2.
- [10]. Nikita Kukra, Pooja Kumbhar, Rupali Bhirud, Priya Kumbhar, India, "Smart Location Based Student Attendance Management System Using Fingerprint Recognition", International Journal of Advanced Research in Computer and Communication Engineering Vol. 7, Issue 5, May 2018