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ijircce@gmail.com

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# AttendEase – A GPS Based Attendance System For Teachers

Viraj Khot, Sankalp Rane, Anish Padelkar, Bhanu Tekwani

Department of Information Technology, Vidyalankar Institute of Technology, Mumbai, India

Department of Information Technology, Vidyalankar Institute of Technology, Mumbai, India

Department of Information Technology, Vidyalankar Institute of Technology, Mumbai, India

Department of Information Technology, Vidyalankar Institute of Technology, Mumbai, India

**ABSTRACT:** Over the years, practically every educational organization has used manual attendance. Marking and monitoring attendance is an integral part to evaluate the candidate's regularity and sincerity but unfortunately, it is time-consuming due to the large universities. Particularly, in the setting of a manual attendance system, it is exceedingly challenging to identify proxy attendance. This issue was addressed through a number of inventions, and automated attendance eventually became a reality. The automation of the attendance system reduces the use of pen and paper thereby saving human efforts as well as time. In this research, we suggested a geo-location-based, face recognition-capable web prototype for attendance tracking that is both practical and affordable. The core concept is to track attendance based on geolocation by using the virtual boundary of the geographical area and face recognition is used to mobilize as well as increase the authenticity of an individual faculty. The candidate will be tagged as present if they are within the virtual boundaries of a geographic area, else they will be marked as absent. The suggested method eliminates the need for any additional hardware and only requires the end user to install an Android application on their smartphone, which increases efficiency and lowers hardware costs all at once.

**KEYWORDS:** Automated attendance, Geo-location-based, Geographical area, Face recognition.

## I. INTRODUCTION

Attendance is considered one of the easiest processes but on the other hand, it is a mandatory process that is required for every organization. For a long time, two types of attendance systems are available i.e. manual and automated. A manual attendance system relies on the use of pen, paper, and time sheets. However, this system introduces erroneous results most of the time. In this study, AttendEase - a secure attendance management system that shares the individual member's location and uses facial recognition technology to confirm their presence on campus is built. A digital image is used in facial recognition technology. The developed technology compares a person's pixels to identify them, opening the door to creating a sophisticated attendance tracking system. Based on facial patterns, face textures, and face shapes, a member's face can be recognized using a variety of algorithms. Deep Learning is employed in this work to compare the extracted image to the images contained in the database. Also, the usage of a GPS location tracking device to locate the candidate is a key component of this endeavor. The combined approach of face recognition and location tracking looks more suitable approach for maintaining an attendance system in any organization.

**Facial Recognition:** A computer vision task called face recognition involves recognizing and authenticating a person from a picture of their face. A computer-driven program that uses a digital image to identify or authenticate a person is known as a facial recognition system. Python libraries are imported for image processing and face recognition. Artificial Intelligence concepts are used to recognize the face of the candidate and predict that the same candidate is using the app. Deep Learning is employed in this research to match the extracted photos with the photographs contained in the database and to extract images from video frames. D-Lib, a Machine Learning Python Library has been employed for this. D-Lib is a deep neural network that is used to identify features in a face image [6].

**Geo-Location:** We used the Google Maps API for real-time tracking and live GPS positioning to record attendance. You can incorporate the Google Maps service with your app using the Google Maps API. An application can be tailored to you by using geolocation to discover your precise location. The information about cell towers and WiFi nodes that the mobile client can identify is used by the Geolocation API to deliver a location and accuracy radius. The protocol used to transmit this data to the server and deliver a reply to the client is described in this paper. POST is used for HTTPS communication. The content type of both the request and the response is application/JSON, and they are both formatted as JSON [7].

## II. PROBLEM STATEMENT

The effective operation of any university or college depends on the registration and maintenance of attendance. The manual attendance system is quite hectic and prone to mistakes. Particularly, in the setting of a manual attendance system, it is exceedingly challenging to identify proxy attendance. A person's attendance can be tracked via their fingerprints, voice, iris, digital signature, and a variety of other digital techniques. But each of these approaches is either expensive or needs periodic upkeep. The automation of the attendance system also reduces the use of pen and paper thereby saving human efforts as well as time. This System is proposed in order to reduce manual work and reduce hardware cost and makes a robust attendance system. This system replaces the traditional method with a mobile application that captures attendance based on geolocation and face recognition.

## III. LITERATURE REVIEW

Attendance systems based on geolocation and facial recognition are two popular technologies that are gaining traction in a variety of industries. The following is a review of the relevant studies and research papers on these topics:

1. E.S. Garba, A. Salihu, and Y. Abubakar (2019): "An Efficient Automatic Attendance System Based on Geolocation and Bluetooth Low Energy Technology." This study proposes an automatic attendance system that tracks and monitors student or employee attendance using geolocation and Bluetooth Low Energy (BLE) technology. A smartphone app is used to scan and detect BLE beacons placed in various locations[1].
2. N.A. Al-Dulaimi, A.A. Al-Rabayah, and A.S. Al-"A Jumaily's Facial Recognition-Based Attendance System Using Raspberry Pi" (2019): This study describes a facial recognition-based attendance system that makes use of a Raspberry Pi as the primary processing unit. A camera is used to capture images of individuals, and a facial recognition algorithm is used to identify and track their attendance[2].
3. P. S. Pasha, R. Gopinath, and A. Raja (2018): "Implementation of an Attendance System Using GPS and Facial Recognition": This study proposes a hybrid attendance system that combines GPS and facial recognition technologies to track students or employees' attendance. The system employs a smartphone app to capture individuals' facial images and GPS coordinates, which are then sent to a server for processing[3].
4. S. Singh, R. Singh, and A. Gupta (2019): "A Hybrid Facial Recognition and Geolocation-Based Attendance System for Universities." This study presents a hybrid attendance system using both facial recognition and geolocation technologies. The system uses a mobile app to collect students' facial images and GPS coordinates, which are then processed and analyzed on a central server[4].
5. A. Tariq, M.A. Qureshi, and A. Sher (2019): "An Automatic Attendance System Using Face Recognition and Geolocation Tracking." This study proposes an automatic attendance system that tracks and monitors employee attendance in the workplace by combining facial recognition and geolocation tracking technologies. Employees' facial images and GPS coordinates are captured using a smartphone app and sent to a central server for processing.[5]

In conclusion, the literature indicates that geolocation-based and facial recognition-based attendance systems have significant potential for improving attendance management in a variety of settings, including educational institutions and workplaces. These systems can improve accuracy, save time and resources, and make life easier for both students and employees.

#### IV. PROPOSED SYSTEM

The following is the functional block diagram of the proposed system:

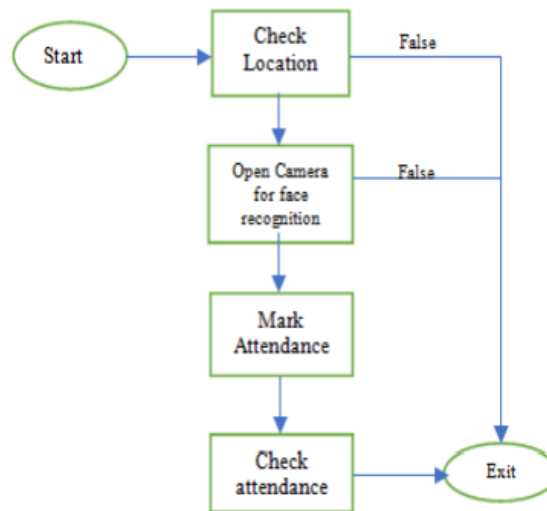


Figure 1: Block Diagram

The proposed system “AttendEase” is a web application which is comprehensive attendance management solution that makes use of React Native, geo-location, and facial recognition technology. The software is intended to provide users with an easy-to-use attendance marking experience, removing the need for manual attendance monitoring. The software uses GPS technology to ensure that users may only mark their attendance from the approved area. The programme authenticates the user's identity using facial recognition technologies, ensuring that only the intended user can register their attendance.

Flask, a lightweight and versatile Python-based web framework, has been used to power the app's backend. The D-lib library, a high-performance open-source library capable of recognizing faces with high accuracy, is used for facial recognition. The backend of the software is designed to ensure smooth performance and scalability, meeting the needs of large organizations with several users indicating their presence at the same time.

The app's data is stored in a Mongo-DB No-SQL database, which is scalable and versatile for document-oriented data storage and retrieval. The programme makes use of Mongo DB's features to store data in a structured fashion that the app can simply access and change. With the help of Mongo-DB's flexible schema, the app can easily adapt to any changes in the data structure.

Organizations and users will benefit from the proposed system in a variety of ways, including precise attendance monitoring, easier attendance management, and decreased administrative burden. Organizations may use this software to ensure that their attendance monitoring system is transparent and efficient, while users can easily and quickly mark their attendance. The system offers a complete attendance management solution, ensuring that attendance data is gathered, stored, and available to authorized personnel.

#### V. RESULT

AttendEase is a web application which requires a GPS-enabled mobile device with a camera and an internet connection is used by a person. To verify the teacher's identity, the camera captures an image of the teacher's face, which is then analyzed and compared to a database of known faces. The system tracks the teacher's attendance as well as their GPS location, which is tracked using a GPS receiver or mobile device. The attendance data is stored in a database and is accessible to authorized personnel for monitoring, reporting, and analysis.

Screenshots:

Main Page: The main page consists of two buttons “Enter” and “Exit” and one section for entering new teacher details labelled as “Admin”:

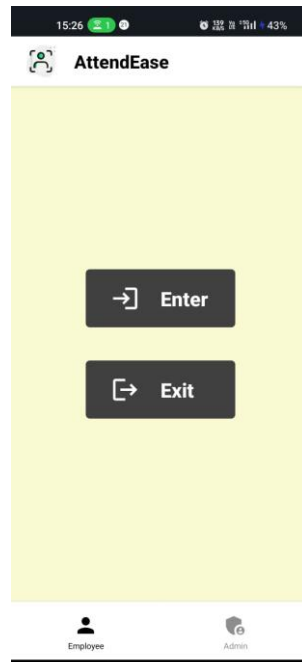


Figure 2: Main Page

Admin Page: This page is used to add new teacher data in the system. The unique ID and face of the teacher is used to create new user:

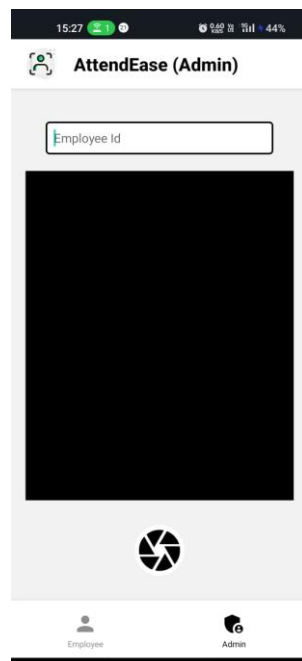


Figure 3: Admin Page

Tracking Geo-Location: The live location of the user is getting tracked while marking attendance:

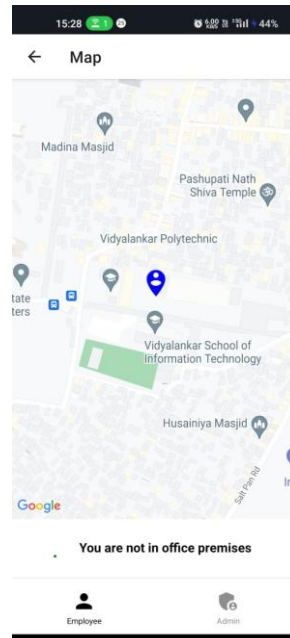


Figure 4: GPS tracking

## VI. DISCUSSION

### BENEFITS

Face recognition and GPS tracking and positioning attendance systems can provide several benefits to colleges, including:

1. Increased accuracy: These systems can track teacher's attendance accurately, reducing the possibility of errors, omissions, or fraud in attendance records.
2. Less paperwork: Automated attendance systems can eliminate the need for manual attendance records, reducing paperwork and administrative tasks.
3. Contactless attendance: The use of face recognition technology, as well as GPS tracking and positioning, can reduce the need for physical contact, which is important for reducing the risk of disease spread on campus.
4. Increased efficiency: Automated attendance systems can help professors and administrators focus on teaching and other important tasks by streamlining attendance tracking.
5. Time savings: These systems can automate the attendance tracking process, saving professors and administrators time that would otherwise be spent manually taking attendance.
6. Real-time monitoring: GPS tracking and positioning can provide real-time monitoring of student attendance, allowing professors and administrators to identify attendance patterns and address any issues that arise.

Overall, attendance systems based on face recognition and GPS tracking and positioning can assist colleges in improving attendance tracking, saving time, reducing paperwork, improving security, and increasing overall efficiency.

### VII. LIMITATIONS

While attendance systems based on face recognition and GPS tracking and positioning have many advantages, there are some limitations that should be considered in college settings:

1. Internet connection required: In order to operate, end users must have a good internet connection.
2. Concerns about privacy: The use of facial recognition and GPS tracking and positioning involves the collection and processing of personal data, which can raise privacy concerns if not handled properly. Teachers may be concerned about such intrusive technologies, especially if they believe their privacy is being violated.
3. Technical issues: Because these systems rely on technology, they can become ineffective if there is a technical issue, such as a network or power outage.
4. Change aversion: Faculty members may be resistant to adopting new attendance tracking methods, particularly if they are accustomed to traditional attendance-taking methods.
5. Biasing: These systems can be biased against specific groups or individuals, resulting in discriminatory outcomes.
6. Reliance on participation: For the system to function properly, teachers must be present and engaged. This requires teachers to be willing and capable of participating in the system, which is not always the case.

Overall, before implementing attendance systems based on face recognition and GPS tracking and positioning, colleges should carefully weigh the pros and cons. Concerns about privacy, technology, and accuracy should be addressed, and efforts should be made to ensure that teachers are comfortable and willing to participate in the system.

#### **VIII.FUTURE SCOPE**

Geolocation-based and facial recognition-based attendance systems have a bright future. Here are a few areas where these technologies could be developed and applied further:

1. Other technologies integration: Attendance systems based on geolocation and facial recognition can be combined with other technologies such as artificial intelligence (AI) and machine learning (ML) to improve accuracy and efficiency. Facial recognition algorithms, for example, can be trained using ML techniques to improve their ability to recognize faces accurately.
2. Intelligent classrooms and offices: Attendance systems based on geolocation and facial recognition can be integrated into smart classrooms and offices to improve overall productivity and efficiency of the learning and working environments. These attendance systems, for example, can be linked with smart lighting, heating, and cooling systems to create a more comfortable and efficient environment.
3. Real-time data analytics: Attendance systems based on geolocation and facial recognition can provide real-time data analytics that can be used to analyze attendance patterns and identify trends. This data can be used to improve educational and working conditions by identifying areas for improvement.
4. Contactless attendance: As the COVID-19 pandemic continues, contactless attendance systems are becoming more popular. Attendance systems based on geolocation and facial recognition can be further developed to allow for contactless attendance tracking, reducing the risk of infection transmission in educational institutions and workplaces.
5. Integration with payroll and human resources management systems: Attendance systems based on geolocation and facial recognition can be integrated with payroll and HR management systems to automate administrative tasks such as payroll processing and employee record-keeping.

Finally, the future potential for geolocation-based and facial recognition-based attendance systems is vast, as are the applications for these technologies. As technology advances, we can expect more advancements in these areas, resulting in more efficient and accurate attendance management systems.

#### **IX.CONCLUSION**

Finally, geolocation-based and facial recognition-based teacher attendance systems have the potential to revolutionize attendance tracking in educational institutions. These technologies provide a variety of advantages, including increased accuracy, decreased administrative workload, increased security, and improved communication.

Attendance systems based on facial recognition provide accurate identification and prevent unauthorized attendance, ensuring that only registered students are permitted in the classroom.

Institution administration can track the attendance of faculty fluently. Ultimately, it becomes easy to make their payroll, track attendance, keep leave records, etc.

By automating the attendance tracking process, these technologies save time and reduce errors, allowing teachers to focus more on teaching and less on administrative tasks, also it decreases the administrative workload for admin. Additionally, the enhanced security provided by these technologies can create a safer and more secure learning environment for teachers.

Overall, geolocation-based and facial recognition-based attendance systems for teachers offer a more efficient, accurate, and secure way of tracking attendance. As technology continues to advance, we can expect to see further developments in these areas, leading to even more innovative solutions for attendance tracking in educational institutions.

#### **X.ACKNOWLEDGMENT**

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