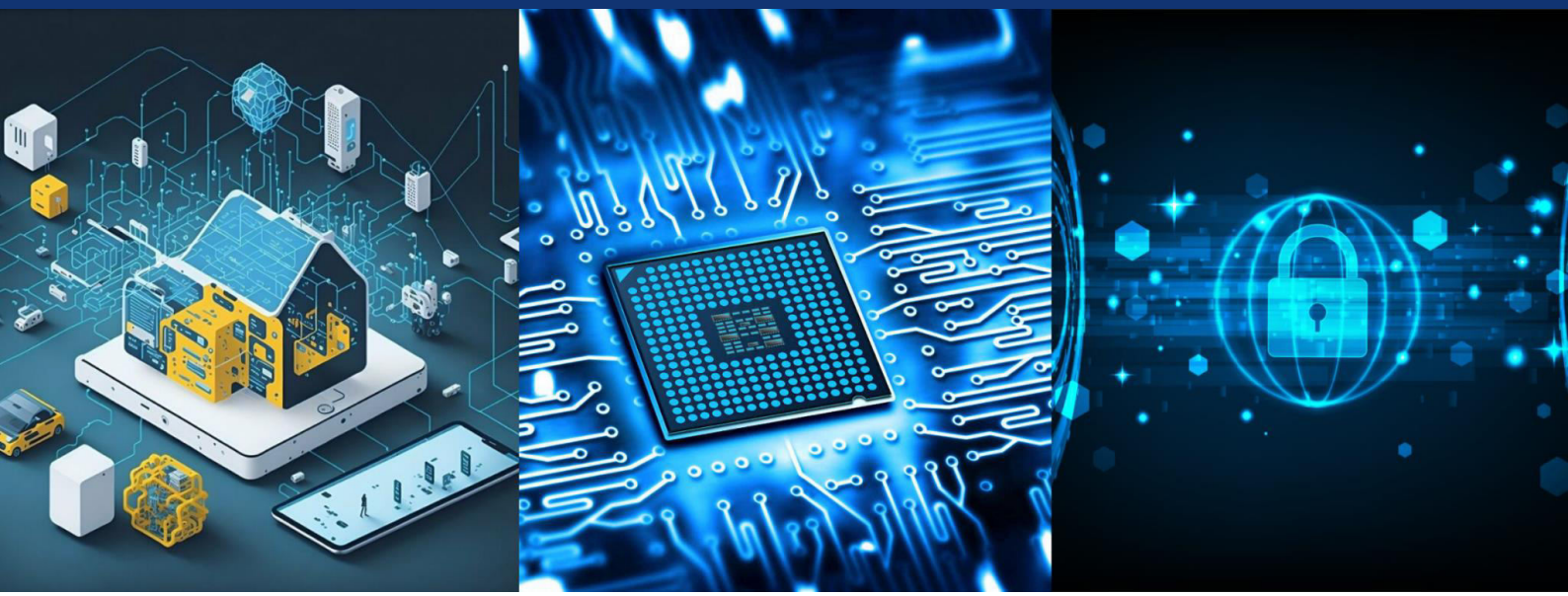
IJIRCCE

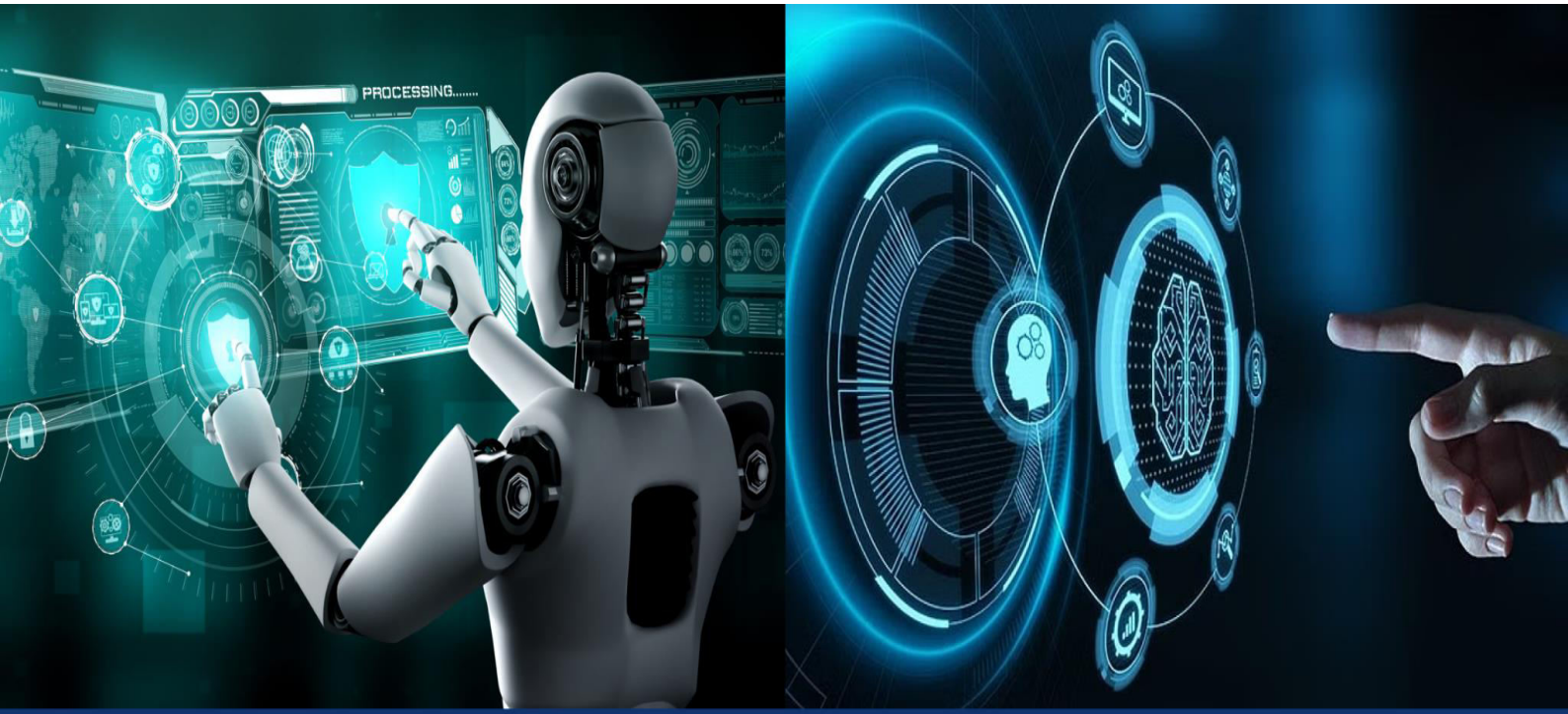
ISSN(O): 2320-9801

ISSN(P): 2320-9798



International Journal of Innovative Research in Computer and Communication Engineering

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.625

Volume 13, Issue 1, January 2025

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301138

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Revolutionizing Attendance with Geospatial and GPS Innovations

Brunda R, Bhavani NG, Bhagyashree, Dr Suma T

BE Students, Department of Computer Science and Engineering, Sri Venkateshwara College of Engineering, Bangalore, Karnataka, India

Professor, Department of Computer Science and Engineering, Sri Venkateshwara College of Engineering, Bangalore, Karnataka, India

ABSTRACT: This paper introduces the integration of advanced geospatial technologies-GPS, geofencing, and mobile applications to introduce attendance management in a new way. The proposed systems will overcome the inherent inefficiencies of traditional methods such as manual errors, high costs, and heavy administration. Use of real-time tracking, geofences will allow easy definition of boundaries set for attendance recording. Other improved features, such as face recognition, NFC tagging, and cloud data storage, will provide more security, accuracy, and efficiency for the solutions. These solutions have been designed for various environments, from remote work to large educational institutions, providing low-cost, highly scalable, and efficient attendance tracking.

KEYWORDS: Attendance management, GPS, geofencing, real-time tracking, mobile applications, automation, and educational technology.

I. INTRODUCTION

Attendance monitoring is one of the core functions in every organization since it serves as a tool of productivity and accountability. However, the traditional methods of logging in such as employing paper logs and using punch cards are often rather time-consuming, susceptible to mistakes and prone to manipulation, ultimately leading to something like proxy attendance. These problems are even worse in the case of large organizations, where the sheer volume of manual tasks can become unmanageable and incorrect. A more modern approach would be to in corporate the geolocation based attendance systems which would make use of GPS and geofencing features to accurately establish when and where employees are attending. This takes away the requirement for expensive equipment and intricate arrangements, which makes it a more practical and economic attendance management method. In this case, the proposed system makes use of GPS and geofencing to provide better accuracy of attendance logs by tracking real time employee location while minimizing human mistakes. On top of this, it also has robust user login to prevent any malicious attacks. The paper seeks to design and implement a secure and scalable system, with GPS as the main alternative that interface with an organizational application software and thereby manage attendance with ease through the use of GPS.

II. LITERATURE SURVEY

Ramlakhan Kumar Chauhan [1] Current studies on the amalgamation of GPS and NFC technologies for the development of attendance tracking systems have been conducted to verify their operation in more efficient and secure ways. GPS covers real-time location tracking and automatic attendance logging as employees enter or leave a place. It meanwhile, points its overcome indoor areas with low signal strength. On the other hand, by using NFC, a user can authenticate securely and contactlessly, so fast and reliable attendance. Moreover, this study from Rahman et al. (2020) gives evidence of the application of the two, which is supposed to provide a more robust solution that includes both location verification and secure identity authentication. The apps designed for smartphones, which institutionalize this strategy, would be a cost-effective means of handling attendance records effortlessly.

Miss.SnehalPagare [2] This research introduces a mechanism for automatic attendance tracking by leveraging the GPS devices in smartphones, utilizing geo-fencing. The system sets up an imaginary fence around a place, say a classroom

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

or office, and then monitors when people come in or go out of the specified area. By blending GPS location information with time-stamped attendance logs, the system guarantees that attendance is captured correctly and immediately. This method differs from traditional approaches where additional hardware such as ID cards or biometric scanners is needed; it makes the procedure simpler by using technology that most people carry in their pockets. The study highlights the feasibility of using geo-fencing as a tool that not only cuts down costs but also ensures safety and user-friendliness of attendance management.

P Sai Vasantha Lakshmi [3] Various approaches have been suggested for recording student attendance with geofencing and mobile-based systems that are on the rise. RFID and NFC do, though, provide a means of identifying customers; their expense may run quite high while technology-based identity verification remains difficult. On the other hand, geo-fencing technology employs Global Positioning System (GPS) to locate students and confine them within limited-areas, making for a cheaper but also better possibility. With regard to delivery, the added timing capability of geo-fencing, makes it possible to verify that a student was, in fact, in the correct place at the right time, which, therefore, reduces fraud. This combination is a more cost-effective workable option of providing checks on attendance in such cases as students disappearing soon after marking their attendance.

Miss. Harshada Sudam Gite [4] In institutions and organizations, the manual handling of attendance can be a complex task due to the accompanying time demands and error possibilities. This problem, together with the general population's expectation for more efficient systems, necessitates the development of technology that can aid the procedure of monitoring the presence of personnel. Utilizing techniques such as Excel for data processing can automatically aid performance tracking and make the traditional paperwork method no more a necessity. Nevertheless, the process of keeping tabs on both onsite and offsite employees is still problematic. The GEO-ATS system, using the combined power of geolocation and geofencing technology, the attendance that had been a complicated process organizations had to deal with, can now be done on the Road. This app and web portal solution are the tools that have come with the system to enable businesses and learning institutions to track and check attendance conveniently.
Shreyash Sanjay Galgale [5] GPS becomes an absolutely necessary component of LBS location-based services that exploit real-time tracking obtained from a device such as a smartphone. Four types of location-based queries are actually range, nearest neighbor, navigation, and geofence queries (Rajachandrasekar 2019). The technique under which GPS or RFID is used is known as Geo-fencing, it creates virtual borders that can monitor if a device enters the area and leaves. It has even fathered many a success story in the ever-reliable attendance monitoring systems, such as one where the user could attend school only if they are within a given area. This technology has been playing a decisive role in car and personnel tracking, thus it has proven to be an effective as well as a precise way of work attendance processes automation.

Rachakolla Sai Viswanath [6] Student attendance continues to be a major issue caused by rigid approaches and mistakes by the traditional methods in higher education. Yet, the recent smart initiatives help to provide solutions to the attendance management process to make it more sophisticated and to minimize the time and attempts required. The "updated Attendance System" is an IoT technology using ultrasonic sensors, Wi-Fi, and GSM technology, which is transmitted through e-mails and conveniently, records may be managed. Despite that, its size, price, and practicality make it a cumbersome tool for the user. Another strategy, the "Management System SUV," demonstrates the tracking function of this technology by matching identifying numbers to GPS locations in real-time. This system, although useful, alongside some disadvantages has introduced itself such as inoperability with certain operating systems as well as no way to manually record students who either forget their ID or are detained.

Sujata C. Papade [7] System that marked its 2019 introduction relies on GPS and Bluetooth for its attendance mark through a web-based platform. Agarwal et al. (2020) have come up with a mobile app that takes care of both fingerprint-based and geofenced attendance. Oke et al. (2022) presented a system that allows attendance to be taken automatically, through a combination of geofencing and face recognition. Jayalakshmi et al. (2019) presented the information that geofencing reduces construction work to be within the specified areas, thus, it enhances accuracy. Such research explores the geofencing's possibilities to be a high secure attendance tracker.

Te-Wei Chiang [8] This chapter looks at different studies on attendance tracking systems that use geofencing, with a focus on how they boost productivity in managing time and attendance. Makhtar et al. (1) came up with a system that uses smartphones and GPS to check in . Sinaga and Setiawan (2) used geofencing for hotel services letting guests check

© 2025 IJIRCCE | Volume 13, Issue 1, January 2025| DOI: 10.15680/IJIRCCE.2025.1301138

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

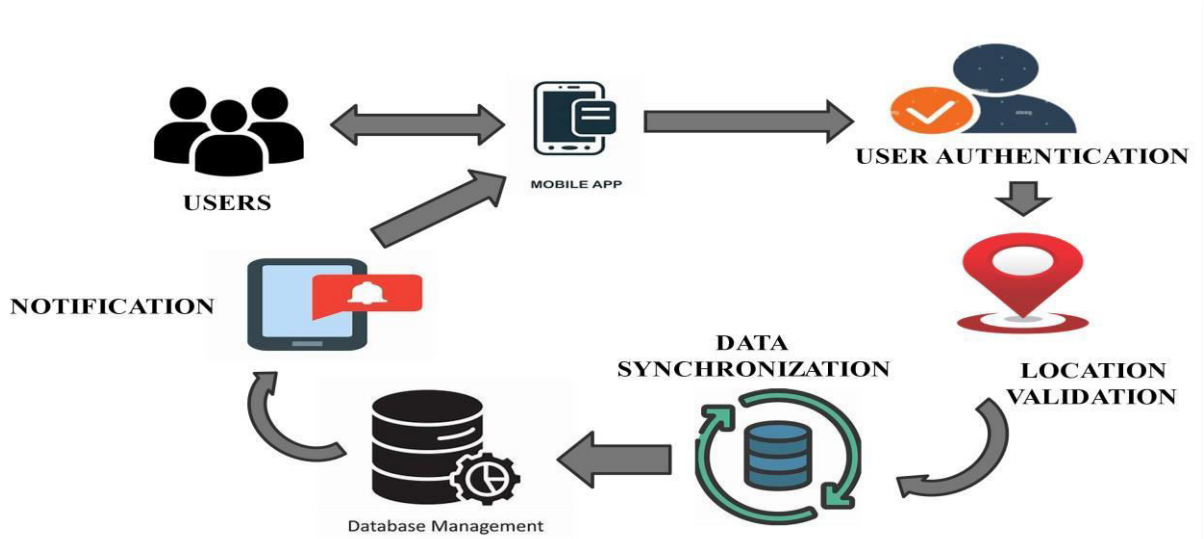
(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

in based on where they are. In schools, systems by Sunaryono (9) and Buddhiwant (4) track attendance in real time using GPS and geofencing. Also new ideas like face recognition and geofencing (Zhao, 13; Ayop 7) make it easier to mark attendance, cut down on cheating, and increase productivity in both classrooms and workplaces.

Babatunde [9] This paper presents a Smart Attendance Management System (SAMS) that blends face recognition and geofencing tech. Regular roll calls take up time and can lead to errors, but SAMS makes the process smoother. It checks students' faces to confirm who they are and uses geofencing to keep an eye on where they are in realtime within the classroom area. Using GPS and machine learning, the system logs attendance on its own when students step into the set zone, getting rid of the need for manual checks. This approach not boosts accuracy but also stops cheating making attendance tracking more productive and trustworthy in schools and colleges.

Enikuomehin A.O [10] Over the past few years, GPS, Bluetooth, and NFC have changed the way we keep track of attendance. These geospatial technologies have made a big impact on this field. Shaikh Muhammad Allayear (2020) came up with a GPS-based system. This system helps companies make sure their workers are where they should be. It cuts down on mistakes and helps follow the rules. Gaurav Raul (2017) put GPS and RFID together. This combo allows real-time tracking on phones. It makes managing attendance more exact and productive. Also more and more people are using Bluetooth and NFC. These are cheap and trustworthy. They offer easy but good ways to mark attendance through phone connections. These new tools are changing attendance systems. They give smarter more correct answers for many different fields.

III. METHODOLOGY



In this study, we suggest a geolocation-based attendance monitoring system that can work without the use of biometric technologies. The system not only meets security, reliability, and convenience standards but also surpasses them. The system is grounded on a mobile app, which is functional but, yet, a user-intuitive design is the interface for the employees to mark the attendance. The high security of the system is guaranteed by multifactor authentication (MFA) that involves passwords with OTP delivered either by email or via SMS. This way, only those who are given access to the system may use it and no one can spy on it.

The critical feature of the system is the validation of the employees' geolocation data, which is accomplished by means of the GPS and geofencing technologies inside pre-defined attendance zones, such as office premises or remote work locations, that the employee must be physically present in. Geofence is a virtual limit that only records employee attendance when the employee is within the demarcated zone. Besides the mentioned above, tools dealing with the security of the system have been integrated into it by the use of trusted device checks and secure location APIs that

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

avoid spoofing (for example when somebody who is not at a certain location appears on the list) of location data or false attendance.

The implementation of the data exchange protocols between nodes and the central database has been carried out which allows for instant updating of attendance records in a centralized database. The database is further secured by encryption algorithms like the AES-256 technique, thus, the private information of both employees and the organization is kept safe. Authenticating users based on their roles in an organization is applied, they are allowed access only to those functions that they are entitled to, this way only managers and administrators mentioned in a certain department can view or edit data. Therefore, the system is free from any attacks of unauthorized access and the chances of data breaches are minimized. Furthermore, the consistent automated database backups give the system the ability to endure data recoveries in the event of failures.

Another feature of the system is intelligent notifications, which make the employees and managers aware of the situation in real-time. The system uses successful attendance submissions, missed check-in, or geolocation errors as alerts for employees while managers are informed about potential anomalies, such as delayed logins, early logouts, or attendance from unauthorized locations. This, in turn, adds to transparency and accountability each of which facilitates timely interventions.

As per, the system is scalable so that it can be leveraged in small and big organizations and also adapt to increasing demands without hampering its performance. Besides, it is equipped with sophisticated error-handling mechanisms that keep it performing even when such events occur. Among the fallbacks, offline mode and manual validation by supervisors, are examples that can be used in cases of poor GPS coverage or technical problems. The system is constantly updated with performance optimizations, security upgrades, and the execution of audits to verify if it is in line with the changes in organizations and conformity to the respective data protection laws.

The inclusion of enhanced features makes the postulated system a new and effective structure for attendance management. The system has a positive impact on organizational efficiency, lessens the management time for the human resources department, and also prevents the risks of traditional attendance systems while offering a secure, accurate, and user-friendly experience for the employees and managers.

IV. RESULTS AND DISCUSSIONS

Therefore, the developments in geolocation-based attendance systems are set to bring about a major transformation in the management of attendance in education and organizational setups. It is easy to track precise attendance within the defined area while eliminating all the possible errors and inefficiencies of traditional systems by integrating GPS and geofencing. It makes an economical solution scalable enough besides automated logging, real-time updates with integration with mobile applications due to the lack of the need to use more hardware, like biometric scanners or RFID devices.

Many systems have facial recognition, GPS tracking, and innovative algorithms to prevent proxy attendance and ensure only authenticated users register their presence. For example, some systems use CNNs or genetic algorithms for facial recognition while others use NFC tagging for more security. Testing and user feedback always emphasize the systems' efficiency, reliability, and user-friendly interfaces that make them suitable for large populations and diverse environments.

Some of the features such as real-time data visualization, automated reporting, and leave management are still included to make the administrative processes even more streamlined and saves time by making individuals answerable. Therefore, future releases will include dependency on the accuracy of GPS in mobiles and internet connectivity.

In a nutshell, the systems are all important for the change towards modern technology in attendance management systems in respect of efficiency, transparency, and scalability for today's educational and work sites.

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

V. CONCLUSION

The integration of geolocation technologies into the management of attendance has undoubtedly upscaled the effectiveness of attendance management systems compared to earlier approaches such as manual systems . The system's use of GPS and geofencing features means no costly hardware investments while also reducing on human factor flaws, thus subsequent attendance records are kept with great accuracy and reliability. Now with a mobile app, real-time tracking of employees' places is possible, which allows for seamless attendance management and makes it harder for employees to absent themselves without leave. This system offers organizations a streamlined, secure, and extended platform to register attendance with minimal intervention from the administrators and promote the responsibility of the employees. It also facilitates secure login credentials thereby enhancing the integrity of the data provided while making it simple for all parties.

REFERENCES

1. A Review on Geo-Location Based Attendance Management System Ramlakhan Kumar Chauhan, Ravi Prakash, Shams Tabrej, Shreya Singh, Student of Institute of Technology and Management, Gida Sector-7, Gorakhpur International Journal of Innovative Science and Research Technology Volume 9, Issue 2, February – 2024
2. Geospatial Attendance Tracking: Leveraging Location Based Technology Miss.SnehalPagare , Mr. Pratik Shardul , Miss. Neha Thakur ,Mr. Shreyash Jadhav ,Mr. Siddesh Malve International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) Volume 4, Issue 3, February 2024
3. Smart Attendance Management System Using Geo-Fencing And Machine Learning P Sai Vasantha Lakshmi, Reddy Kumaraswamy , Advin Manhar IJCRT | Volume 11, Issue 6 June 2023 | ISSN: 2320-2882
4. Gps Based Attendance System Using Geofencing Miss. Harshada Sudam Gite, Miss. Pooja Balasaheb Kawade, Miss. Harshada Sanjay Aushikar, Miss. Ashwini Mothabhau Gangurde, Prof. N. S. Khairnar May 2023 IJSDR | Volume 8 Issue 5
5. The Location Based Attendance System Shreyash Sanjay Galgale , Jabibullah Sayyad Yamakanamardi, Samiksha Ramesh Koli , Mohammadayan Jahangir Desai International Research Journal of Modernization in Engineering Technology and Science Volume:05/Issue:04/April-2023
6. Geofencing-Based Attendance Tracking: A Novel Based Approach For Accurate And Efficient Time And Attendance Management Rachakolla Sai Viswanath , Nareddy Shreya , Shaik Sufiyan , Suram Aarthi , Dr. M. Ravikanth International Research Journal of Engineering and Technology (IRJET) Volume: 10 Issue: 03 | Mar 2023
7. Design and Analysis of Geographical Attendance Tracking System Sujata C. Papade International Journal of Engineering and Management Research Volume-13, Issue-2 (April 2023)
8. Development and Evaluation of an Attendance Tracking System Using Smartphones with GPS and NFC TeWei Chiang, Cheng-Ying Yang, Gwo-Jen Chiou, Frank Yeong-Sung Lin, YiNan Lin, Victor R. L. Shen, Tony Tong-Ying Juang & Chia-Yang Lin 2022 The Author(s). Published with license by Taylor & Francis Group
9. Mobile Based Student Attendance System Using Geo-Fencing With Timing and Face Recognition Babatunde, A.N. , Oke, A.A. , Babatunde, R.S , Ibitoye, O. & Jimoh, E.R. n International Journal of Advances in Pharmaceutical Sciences · March 2022
10. A Mobile Web Application for Attendance Management Using Geolocation Lala O. G.1 , Aworinde H. O.2, Ogunbanwo A. D.2, Oduwole O. A.1, Adepegba O. A.1 and Onamade A. A.1 Adeleke University Journal of Science (AUJS) Volume 1 Issue 2, September 2022
11. Geolocation-based Group Formation and its Mobile Application Prototype Anon Sukstrienwong TEM Journal. Volume 11, Issue 3, pages 1154-1164, ISSN 2217-8309, DOI: 10.18421/TEM113-21, August 2022.
12. Geolocation-Based Mobile Application Twana Mustafa, Firat University, Turkey Zardasht Abdulaziz Shwany, Erbil Polytechnic University, Iraq Shwan Hadi Saeed, Salahaddin University, Iraq Karwan Khoshnaw, Erbil Polytechnic University, Iraq International Journal of Software Innovation Volume 10 • Issue 1 2022
13. Iot Based Smart Attendance System Using Rfid: A Systematic Literature Review Kashif Ishaq1*, Samra Bibi1 2022
14. Geolocation Based College Attendance System Abhishek Morankar*1, Ronak Baviskar*2, Rohit Vishwakarma*3, Sushant Patil*4, Prof. Mr. Nitin Ujgare*5 International Research Journal of Modernization in Engineering Technology and Science Volume:03/Issue:04/April-2021
15. Geofencing Based Attendance Monitoring System Enikuomehin A.O, Dosumu O.U, International Journal of Engineering And Science Vol.11, Issue 1 (January 2021)

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi crossref

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details