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Design and Development of an Integrated Attendance and Task Management Application Based on Android

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ABSTRACT

Employee attendance and task management are important elements in maintaining organizational productivity, accountability, and operational efficiency. Conventional attendance systems, such as manual recording and fingerprint devices, still face several limitations including fraud potential, inaccurate data recording, and lack of flexibility for field employees. This research aims to design and develop an integrated Android-based attendance and task management application by utilizing Global Positioning System (GPS), Location Based Service (LBS), visual attendance validation, and real-time task monitoring features. The system was developed using the Rapid Application Development (RAD) approach combined with Agile Development to accelerate system implementation through iterative processes and continuous user feedback. The application integrates attendance recording, GPS location validation, employee task assignment, progress monitoring, and deadline notifications into a single platform. System testing was conducted using the Black-box Testing method to evaluate application functionality and reliability. The results show that the developed system successfully performs core functions such as login, GPS-based attendance, task management, attendance reports, and task monitoring with a testing success rate of 94%. The system is also capable of reducing attendance manipulation through real-time location validation and activity monitoring mechanisms. This research contributes an integrated mobile solution that improves attendance accuracy, task transparency, work efficiency, and employee productivity in organizations with high workforce mobility.

INTRODUCTION

Employee attendance discipline is an important factor in improving organizational productivity, accountability, and service quality. In modern companies with high workforce mobility, attendance systems not only function as work-time recorders but also become part of operational control and performance evaluation. However, conventional attendance systems, either manual or based on static devices such as fingerprint scanners, barcodes, or QR codes, still face several limitations, including attendance queues, fraud potential, data inaccuracy, location limitations, and maintenance costs.

Previous studies have shown that Android-based attendance systems integrated with Global Positioning System (GPS) and Location Based Service (LBS) technologies can improve attendance validation accuracy and reduce attendance fraud (Fadillah & Jalil, 2024). GPS-based attendance systems provide real-time location tracking and ensure employees perform attendance activities within designated work areas (Nazara, 2024). In addition, geofencing technology has been implemented to improve attendance validation efficiency in organizations with high workforce mobility (Shahab & Sarno, 2020).

Furthermore, face recognition technology has been widely adopted as an additional security layer in attendance systems. Research conducted by Muslim (2025) demonstrated that integrating face recognition, liveness detection, and GPS verification significantly improves attendance security and minimizes identity falsification. Similarly, Sunaryono et al. (2021) developed an Android-based attendance system using face recognition technology that achieved high identification accuracy and operational efficiency.

On the other hand, employee attendance management cannot be separated from task management and employee work monitoring. Mobile-based task management systems have been developed to support task scheduling, work distribution, progress tracking, and deadline notifications (Setiawan et al., 2024). However, most previous studies implemented attendance systems and task management systems separately, resulting in fragmented employee monitoring processes.

Based on these problems, this research aims to design and develop an integrated Android-based attendance and task management application that combines GPS-based attendance, visual validation, and task management features into a unified platform. The proposed system is expected to improve operational transparency, employee accountability, work efficiency, and productivity, especially in organizations with high employee mobility.

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LITERATURE REVIEW

Previous studies have demonstrated that Android-based attendance systems utilizing GPS and geofencing technologies can improve attendance validation accuracy and minimize attendance fraud. Fadillah and Jalil (2024) developed an Android attendance application integrating face recognition and GPS location validation to improve attendance reliability. Similarly, Shahab and Sarno (2020) implemented geofencing and face recognition technologies in an Android-based presence recognition system to increase location validation accuracy.

Research conducted by Nazara (2024) showed that Location Based Service (LBS)-based attendance systems improve operational flexibility and reduce manual attendance errors. In addition, Muslim (2025) integrated face recognition, liveness detection, GPS, and QR code technologies into an employee attendance system to strengthen identity verification and attendance security.

In the field of task management, Setiawan et al. (2024) developed an Android-based task management and collaboration application that improved employee coordination, task monitoring, and work productivity. Likewise, Rachman and Prabowo (2022) proposed a mobile-based attendance and task management system that supported productivity monitoring during remote working conditions.

Although many studies have discussed attendance systems and task management applications independently, limited research has integrated both functionalities into a single Android-based platform. Therefore, this study introduces an integrated solution combining GPS attendance validation, attendance monitoring, and employee task management within one mobile application to improve organizational operational efficiency and employee accountability.

METHOD

This study uses the Rapid Application Development (RAD) method combined with the Agile Development approach. The development process consists of several iterative stages as follows:

Planning Stage

This stage focuses on identifying problems related to manual attendance systems, employee supervision, and task management. Functional and non-functional system requirements are analyzed to determine system specifications.

Design Stage

At this stage, the system architecture, user interface (UI/UX), database structure, and system workflows are designed. Several diagrams are created to represent the proposed system, including flowcharts, use case diagrams, class diagrams, activity diagrams, and sequence diagrams. The flowchart illustrates the overall operational process of the application.

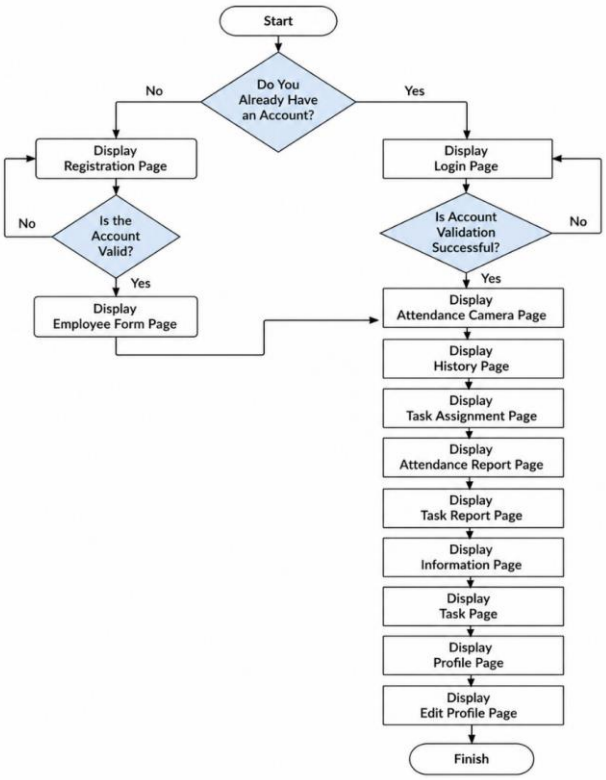

Figure 1. Research Flow of the Proposed System

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The flowchart describes the iterative development process consisting of planning, design, development, testing, release, and feedback stages. This approach enables continuous system improvement based on user evaluation and testing results.

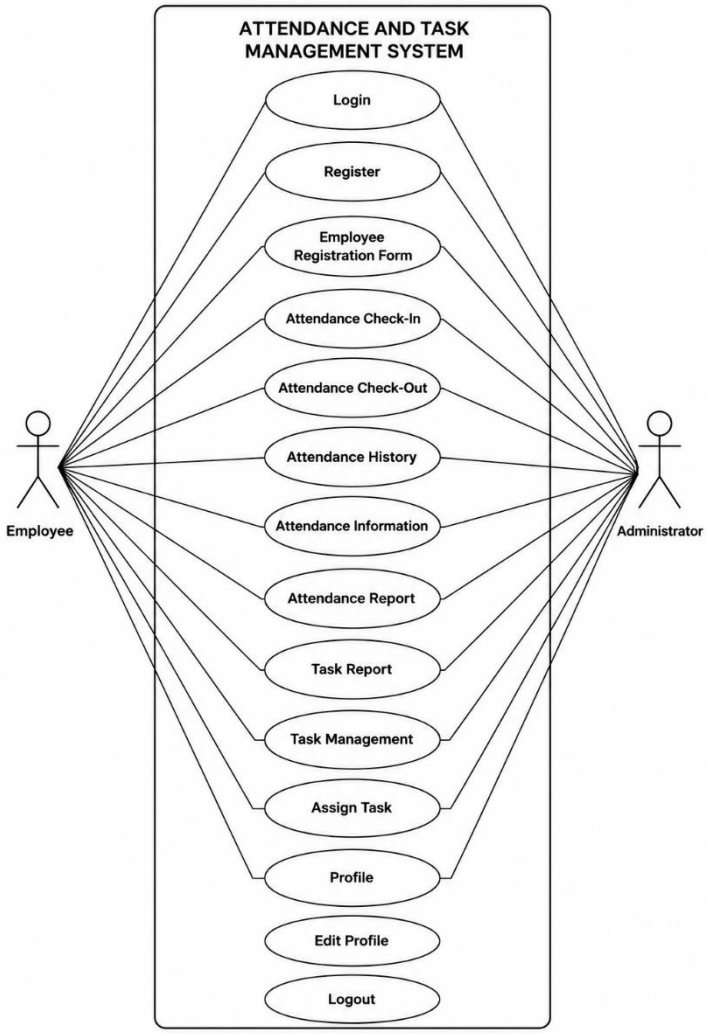

Figure 2. Use Case Diagram of the Proposed System

The use case diagram illustrates the interaction between users and the proposed attendance and task management application. The system involves two main actors, namely employees and administrators, who interact with various application features according to their respective roles and access rights.

Employees are able to perform several main functions, including user registration, login authentication, attendance check-in and check-out, viewing attendance history, accessing attendance information, managing assigned tasks, updating profile information, and logging out from the system. Meanwhile, administrators have additional privileges such as monitoring attendance reports, managing employee task reports, assigning tasks, and supervising overall employee activities through the administrative dashboard.

The use case diagram provides a general overview of the functional requirements of the system and demonstrates how users interact with the application to support attendance management and task monitoring processes efficiently.

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The class diagram represents the relationships between system components and database entities.

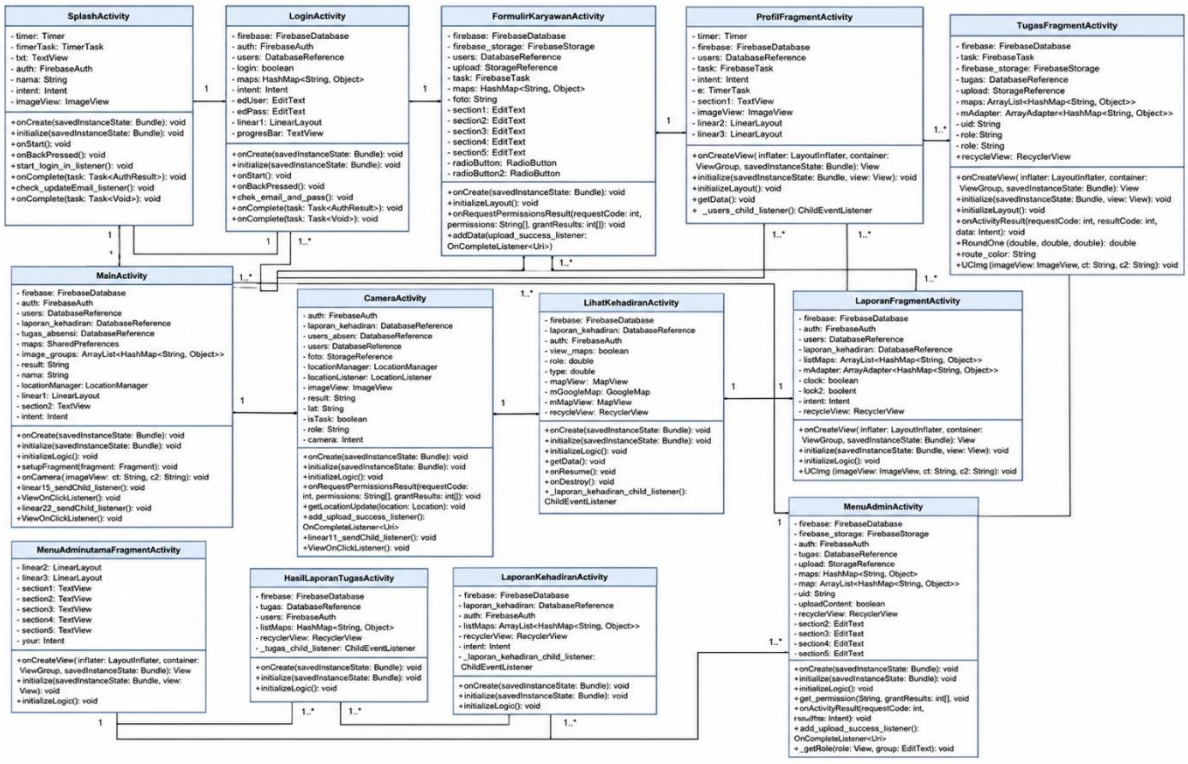

Figure 3. Class Diagram of the Proposed System

Activity diagrams were designed to illustrate the workflow of user activities within the proposed application, including login, attendance check-in and check-out, task management, attendance reporting, and profile management processes. These diagrams help describe the operational flow of the system from the user perspective and ensure that each application feature functions according to the defined business process requirements.

In addition, sequence diagrams were developed to represent the interaction sequence between users, application interfaces, system modules, and the database during system execution. The sequence diagrams describe the communication flow involved in processes such as authentication, attendance data submission, task assignment, task updates, and report generation.

Due to page limitations, only the primary system architecture diagrams are presented in this paper, while the detailed activity and sequence diagrams are documented in the complete research report.

Development Stage

The development stage involves implementing the designed system into an Android-based application. Several core modules were developed, including the GPS-based attendance module, camera attendance validation module, employee task management module, user authentication system, and administrative dashboard. The development process was carried out iteratively following the Agile and Rapid Application Development (RAD) approaches to ensure flexibility and continuous improvement throughout the implementation phase.

Testing Stage

System testing was conducted using the Black-box Testing method to evaluate the functionality, reliability, and compatibility of the application across different Android devices. The testing process focused on validating major system features such as user authentication, GPS-based attendance, attendance reporting, task management, file uploads, and administrative monitoring functionalities. The testing results indicate that the developed system successfully operated according to the defined functional requirements.

Release Stage

After the testing process was completed, the application was released as a beta version for limited organizational testing and operational trials. The beta release allowed users to utilize the attendance and task management features in real working conditions before the final deployment stage.

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Feedback Stage

User feedback was collected from employees and administrators to identify system limitations, evaluate usability, and improve application performance. The collected feedback was analyzed and utilized as a reference for future system enhancements and iterative development processes.

RESULT

This research successfully developed an integrated Android-based attendance and task management application. The developed system combines GPS-based attendance, camera attendance validation, employee task management, attendance reporting, and administrative monitoring within a single mobile platform.

The application was implemented using the Rapid Application Development (RAD) and Agile Development approaches. Several core features were successfully developed, including login authentication, attendance check-in and check-out, task assignment, attendance history, attendance reports, task monitoring, and profile management.

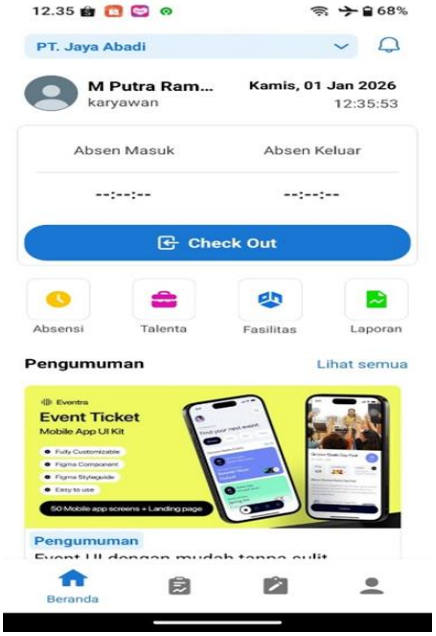

Figure 4. Shows the prototype interface of the developed Android application.

The attendance module successfully records attendance data, including timestamps, GPS coordinates, and photo evidence captured through the device camera. The developed system also supports real-time attendance validation and location monitoring.

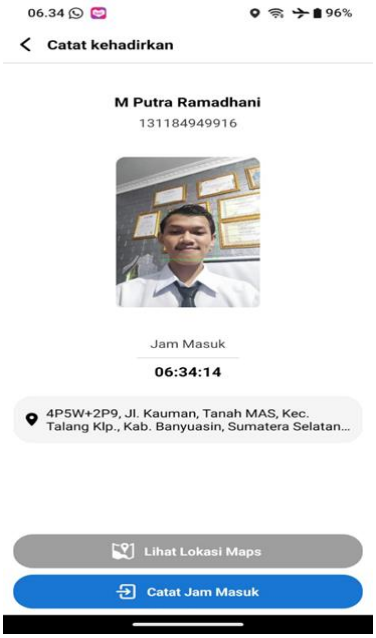

Figure 5. presents the GPS-based attendance module implemented in the application.

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In addition, the task management module allows administrators to assign tasks and enables employees to upload task completion reports and monitor task status directly through the application.

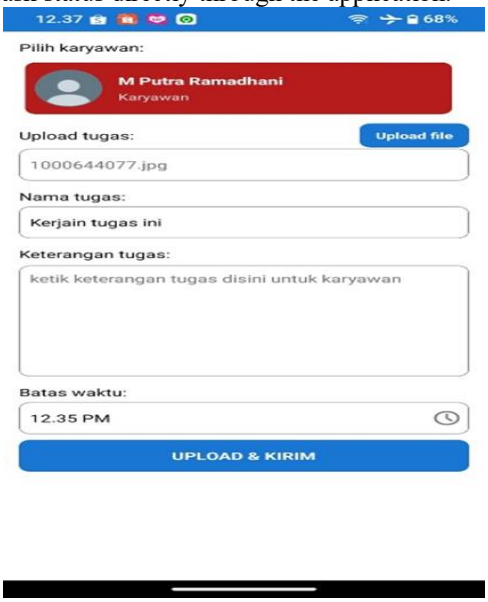

Figure 6. illustrates the employee task management feature.

System functionality testing was conducted using the Black-box Testing method. The testing process evaluated several core functions, including authentication, attendance validation, task management, attendance reporting, and file upload functionality.

Table 1. presents the summary of system testing results.

Feature	Result
Login Authentication	Successful
GPS Attendance	Successful
Attendance Report	Successful
Task Management	Successful
Task Upload	Successful
Admin Dashboard	Successful
Overall Testing Success Rate	94%

The testing results presented in Table 1 indicate that all core application functionalities operated successfully according to the predefined system requirements. Features such as login authentication, GPS attendance validation, attendance reporting, task management, task upload, and administrative dashboard monitoring performed properly during the testing process. The overall testing success rate of 94% demonstrates that the developed application is functionally reliable and capable of supporting organizational attendance and task management processes effectively.

DISCUSSION

The developed application successfully integrates attendance management and employee task management into a single Android-based platform. The integration of GPS-based attendance and task monitoring improves operational efficiency, employee accountability, and attendance transparency within the organization.

Compared to conventional attendance systems, the proposed application provides greater flexibility for employees with high mobility because attendance validation can be performed remotely using GPS and camera-based verification. In addition, the task management feature allows administrators to monitor employee work progress more effectively through real-time task reporting.

Compared with previous studies that only focused on attendance systems (Fadillah & Jalil, 2024; Muslim, 2025), the proposed application integrates attendance validation and task management into a single platform. This integration improves monitoring efficiency and provides a more comprehensive employee performance evaluation system. Furthermore, the use of GPS-based validation and real-time task monitoring contributes to higher operational transparency and employee accountability.

The implementation of location validation also helps minimize attendance manipulation and improves attendance data accuracy. Furthermore, the integration of attendance and task management modules provides organizations with a more comprehensive employee performance monitoring system compared to previous studies that generally implemented both systems separately.

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However, several limitations were identified during system testing. GPS accuracy may vary depending on internet connectivity, environmental conditions, and smartphone sensor quality. Additionally, camera-based attendance validation still depends on image quality and user compliance during attendance capture.

Overall, the developed system demonstrates strong potential to support modern organizational operations, particularly for companies with high workforce mobility and distributed working environments. Future development may focus on implementing advanced biometric verification, liveness detection, and artificial intelligence-based attendance validation to further improve system security and reliability.

CONCLUSION

This research successfully designed and developed an integrated Android-based attendance and task management application using the Rapid Application Development (RAD) and Agile Development approaches. The developed system integrates GPS-based attendance, attendance validation, employee task management, attendance reporting, and administrative monitoring within a single mobile platform.

Based on the Black-box Testing results, the application successfully performed major functionalities such as login authentication, attendance check-in and check-out, task assignment, attendance reporting, and task monitoring with an overall success rate of 94%.

The proposed system contributes to improving attendance accuracy, employee accountability, operational efficiency, and work transparency, especially in organizations with high workforce mobility. However, the system still has several limitations related to GPS accuracy and internet connectivity. Future development may focus on implementing advanced biometric verification and artificial intelligence-based attendance validation to further improve system security and reliability.

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