Attendance Information System for Interns at The Surakarta City Transportation Department

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Abstract
The attendance process for interns at the Surakarta City Transportation Department is still conducted manually, making it less effective, prone to recording errors, and difficult in terms of attendance data management. This study aims to design and develop a web-based internship attendance information system to improve the efficiency and accuracy of attendance recording. The research method employed is the Waterfall method, which consists of requirements analysis, system design, implementation, testing, and maintenance stages. The results indicate that the system was successfully developed according to user requirements, featuring multi-user login access for administrators, interns, and supervisors. The system is capable of automatically recording check-in and check-out attendance using facial recognition and location verification, while storing data in a structured database. Furthermore, the system facilitates internship participant management and enables the generation of attendance reports quickly and accurately. Based on Black Box Testing, all system functions operated as expected. Therefore, the system can enhance the effectiveness and efficiency of internship attendance management at the Surakarta City Transportation Department.

1. Introduction

In this ever-evolving digital age, the application of information technology in education has become crucial, particularly for managing data efficiently and accurately [1]. The Surakarta City Transportation Agency is a local government agency responsible for managing and providing transportation and traffic services within the city of Surakarta. In addition to carrying out public service functions, this agency also regularly accepts interns from various universities and vocational schools as part of educational partnerships and efforts to develop student competencies. Interns are assigned to various work areas based on the agency's needs, making administrative management including attendance tracking a vital component in ensuring the smooth operation of the internship program.

Attendance tracking is a fundamental element in the management of interns, playing a crucial role in fostering a culture of discipline and accountability in the workplace [2]. Attendance tracking is often referred to as "absenteeism" [3]. However, the manual attendance systems still widely in use often pose various challenges, such as susceptibility to data manipulation, delays in data compilation, and a lack of transparency and efficiency [4].

The use of digital information technology in Indonesia, particularly in educational institutions, is growing rapidly [5]. Based on initial observations, the attendance tracking process for interns at the Surakarta City Transportation Agency is still conducted through a signature-based system on daily attendance sheets. Each intern is required to sign the provided attendance list, after which the data is periodically compiled by the administrative department. While this mechanism has generally functioned well, several challenges remain in its implementation. The manual recapitulation process takes a relatively long time, especially when there are a large number of interns [6]. Additionally, there is a possibility of sloppy record-keeping or missed signatures, which can affect the accuracy of attendance data. Storing physical archives also requires extra care to prevent document loss or damage [7].

Several previous studies have shown that the implementation of a web-based attendance information system can help improve the efficiency and accuracy of attendance recording [8]. The implementation of features such as automatic time recording, location validation, and digital documentation has been proven to simplify the monitoring process and minimize administrative errors. These findings demonstrate that the digitization of attendance systems not only supports the effectiveness of administrative work but also contributes to increased transparency and accountability in data management [9]. Given these circumstances, there is a need for a web-based attendance information system for interns that can manage attendance data in an integrated and well-documented manner. The system designed in this study will provide user authentication features,

The methods used in data collection include: research methods, interviews, and literature review. Meanwhile, software development uses the waterfall model, which includes: requirements analysis, design, coding, testing, and implementation [10].

Online attendance refers to the collection of data to determine the number of employees present at an office; for each employee who clocks in, their data is entered into the attendance system [11]. This study aims to analyze the requirements for an intern attendance system that aligns with the conditions and challenges faced by the Surakarta City Transportation Agency, and then to design and develop a web-based Intern Attendance Information System using the Waterfall method. The research methods we employed include field research, interviews, and a literature review [12]. The developed system will be implemented with various key features, such as automatic time stamping, GPS-based location validation, photo uploads as proof of attendance, as well as attendance data summarization and reporting. With this system, it is hoped that the process of recording, monitoring, and reporting intern attendance can be carried out more efficiently, accurately, and in a structured manner.

Previous Research

First, Dinar Mersasi Kirana, Aditya Akbar Riyadi, and Arief Susanto (2025) conducted a study titled "Web-Based Employee Personnel and Payroll Information System with Selfie and Location Monitoring Features" [13]. This study employed the Waterfall system development method, which includes the stages of analysis, design, implementation, testing, and maintenance. The research resulted in a personnel and payroll system equipped with attendance validation features using selfies and GPS, as well as integrated with payroll calculations and the management of employee leave and time off. That study focused on general human resources needs, particularly regarding payroll. Meanwhile, the present study does not address payroll but focuses on intern attendance, incorporating selfie and GPS features, daily activity logging, and the upload of photographic evidence of activities as a means of more comprehensive internship monitoring [14].

Second, a study titled "Implementation of a Web-Based Employee Attendance System Using the PIECES Method at PT Global Jet Commerce." This study used the PIECES method to analyze the performance of the developed web-based attendance system. The resulting system provides standard attendance features and helps improve the management of employee attendance data [17]. However, the system does not yet include location validation, activity documentation, or photographic evidence of attendance. In contrast, this study adds selfie features, GPS, daily activity logging, and the uploading of photographic evidence of activities as an effort to enhance the transparency and accuracy of intern attendance tracking.

Third, a study titled "Design of a Web-Based Internship Attendance and Reporting System at PT Gresik Migas" was conducted. This research involved the stages of system analysis, development, and implementation. The result was a web-based internship attendance and reporting system aimed at improving the accuracy of attendance records and the efficiency of documenting interns' activities [15]. Although both studies address web-based internship attendance systems, those previous studies still relied on basic attendance tracking and activity reports without location validation or selfie-based attendance verification. In contrast, this study incorporates features such as GPS validation, selfie photo uploads, daily activity logging, and photographic evidence of activities, thereby making attendance tracking more accurate and minimizing the potential for misuse.

Fourth, a study titled "Implementation of Human Resource Management in the Human Capital Management Division of PT Sinergi Gula Nusantara" was conducted using a qualitative descriptive approach through interviews, observations, and documentation. The research results indicate that human resource management has been running well but still requires optimization, particularly in the areas of reporting and monitoring [16]. That study did not focus on the development of an attendance information system or attendance validation. The current study, however, specifically designs a web-based attendance information system for interns equipped with selfie, GPS, daily activity, and photographic evidence features to support a more effective monitoring process.

Theoretical Framework

The development of this system is based on the concept of an Information System designed to manage attendance data effectively and efficiently and to support real-time monitoring of intern attendance [18]. Additionally, this system leverages the concept of digital transformation to convert manual attendance processes into computerized ones, thereby improving data accuracy and transparency. Technically, the system was built using the Laravel framework with a Model-View-Controller (MVC) architecture to ensure a more organized and easily expandable code structure, and it uses a MySQL database for structured data management [19]. The Waterfall development method was employed, encompassing the analysis, design, implementation, testing, and maintenance phases, enabling the system to be developed systematically according to user needs [20].

2. Research Methods

The research method used in this study was the Waterfall system development method, which was carried out in stages and sequentially. The first stage was requirements analysis, which involved identifying problems and user needs through observation and interviews at the Surakarta City Transportation Agency. The next stage was system design, which included designing the system model using UML, designing the database, and designing the user interface. This was followed by the implementation phase, which involved translating the system design into a web-based application in accordance with the specified requirements. The next phase was system testing using the Black Box method to ensure that all system functions operated properly as expected. The final phase was maintenance, which was carried out to maintain system performance, correct any errors found, and further develop the system to ensure it remained aligned with user needs. By using this method, it is hoped that the developed system will operate optimally and in a structured manner.

Data Collection Methods

a. Observation

Observation was conducted by directly observing the attendance process of interns at the Surakarta City Transportation Agency. The purpose of the observation was to identify workflows, weaknesses in the manual system, and the features required by users.

b. Interviews
Interviews were conducted to gather information regarding the requirements for the intern attendance system. Interviews were conducted with several parties involved in the attendance process—namely, interns, supervisors/administrators, and management at the Surakarta City Transportation Agency—to ensure a more comprehensive understanding of the system's requirements.

c. Documentation Review
A documentation study was used to collect data in the form of attendance forms, activity reports, internship schedules, and personnel administration SOPs. Additionally, relevant journal articles and previous research were reviewed.

d. Literature Review
Data collection was conducted through a literature search of scientific journals published in the last five years that discuss attendance systems, personnel information systems, GPS usage, selfie features, and web-based system development.

System Development Methodology

a. Requirement Analysis
In this phase, system requirements are gathered through observation, interviews, and documentation. The requirements collected include the selfie attendance feature, GPS location verification, recording of daily activities, and uploading of photos as proof of activities.

b. System Design
This stage involves designing the system architecture and database, as well as creating UML diagrams such as use case diagrams, activity diagrams, class diagrams, sequence diagrams, and user interface (UI) designs.

c. Coding
Once the system design is complete, this phase focuses on developing a web-based application using the specified programming languages and frameworks, such as PHP/Laravel or JavaScript/Node.js.

d. Testing
Testing was conducted using the black-box testing method to ensure that every feature functions according to user requirements, particularly the selfie, GPS, and photo upload features. In addition, User Acceptance Testing (UAT) was conducted, involving interns, administrators/mentors, and management.

e. Deployment
The system will be installed and tested directly by users within the Surakarta City Transportation Agency.

f. Maintenance
This phase includes bug fixes, feature updates, and system adjustments based on user feedback.

3. Result and Discussion

The result of this research is a web-based intern attendance information system designed to streamline the process of recording attendance, monitoring activities, and managing intern data in an integrated manner. This system was developed using the Waterfall method, which includes the analysis, design, implementation, and testing phases. The main features of this system include login, a dashboard, selfie- and GPS-based check-in and check-out, attendance history, intern data management, absence data management, absence correction, attendance reports, and report printing in document format. This system can be accessed by three main user roles—administrators, supervisors, and interns—according to their respective access rights.

User Interface Implementation Results

User interface implementation involves transforming the previously created design into a functional system interface for users. The results of this implementation include several main pages such as the login page, dashboard, attendance, attendance history, data management, and reports tailored to the needs of the admin, supervisors, and interns.

Login Page (all user)

The login page is the starting page used by all users including administrators, managers, and interns to access

the system. On this page, users are prompted to enter their registered username and password. The system will validate the information; if the credentials are correct, users will be redirected to the main page corresponding to their respective access rights. If the credentials are incorrect, the system will display an error message and ask the user to repeat the login process.

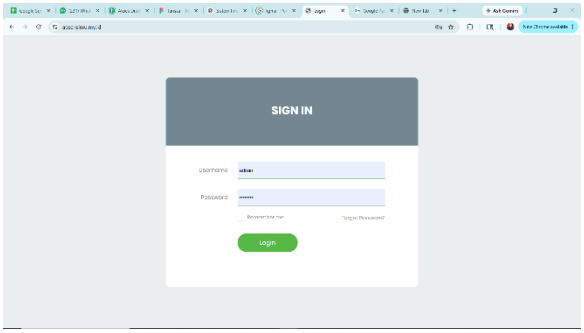

Figure 1. Login Page

Dashboard Page (Manager/Admin)

The dashboard page serves as an information hub that displays a summary of intern attendance data. On this page, admins and managers can view real-time attendance statistics, such as the number of attendees, absences, and intern data. The dashboard is designed to facilitate the monitoring process without the need to review data manually.

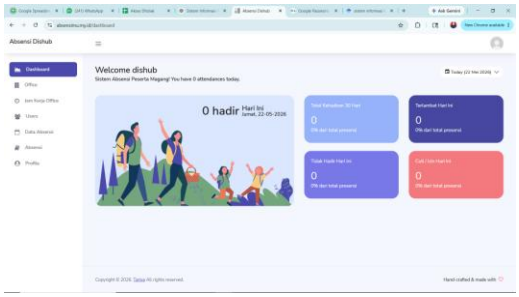

Figure 2. Manager/Admin Dashboard Page

Attendance

The attendance page is used by interns to record their attendance, including both check-ins and check-outs. The attendance process involves taking a photo (selfie) and validating the location (GPS) to ensure data accuracy. If the validation process is successful, the attendance data will be saved to the system; if it fails, the user is prompted to repeat the process.

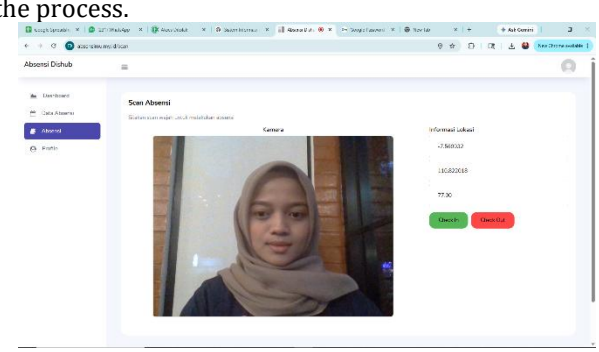

Figure 3. Attendance Page Display

Attendance History

The attendance history page is used by interns to view their previous attendance records. The information

displayed includes the date, check-in and check-out times, and attendance status. This page helps users monitor their attendance history independently.

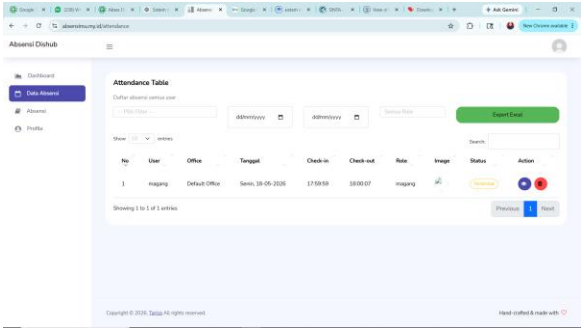

Figure 4. Attendance History Page

Data Management

The data management page is used by administrators to manage intern data and attendance records. On this page, administrators can add, edit, and delete participant data, as well as manage attendance records. This feature is designed to ensure that the data stored in the system remains accurate and organized.

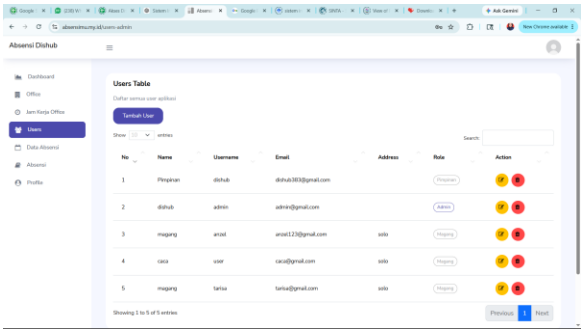

Figure 5. Data Management Interface

Attendance Reports and Printing

The report page is used by administrators and managers to view a summary of intern attendance data for a specific period. In addition, the system provides a report printing feature that allows users to export attendance data to file formats, such as Excel, thereby facilitating the reporting and documentation process.

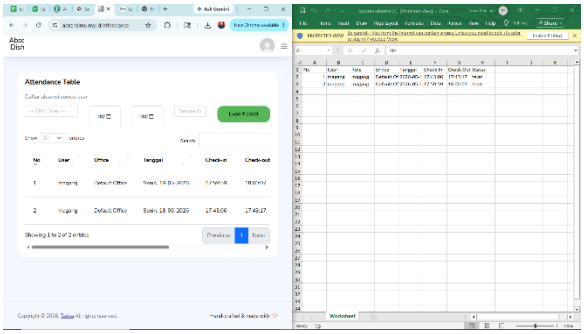

Figure 6. Attendance Reports and Printing Interface

4. Conclusions

Based on the results of this study, it can be concluded that the web-based intern attendance information system developed is capable of improving the effectiveness and efficiency of the attendance recording process. The implementation of the selfie feature and GPS location validation has proven to increase data accuracy and minimize the potential for attendance fraud. In addition, this system also makes it easier for administrators

and supervisors to monitor and manage attendance data through dashboard, report, and attendance printout features. Suggestions for future research include developing the system into a mobile application, improving GPS accuracy, and adding notification and daily activity report features to make the system more optimal and comprehensive.

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