

## Development of a Web-Based Attendance System for Internship Students with Using Coordinate Point Validation

Muhammad Fadlan Alamsyah<sup>1</sup>, Khaila Mukti Harahap<sup>2</sup>

<sup>1</sup> Universitas Islam Negeri Sumatera Utara; mfdlanss@e-mail.com

<sup>2</sup> Universitas Islam Negeri Sumatera Utara; muktiharahap321@e-mail.com

---

### ABSTRACT

This study aims to develop a web-based attendance system with check-in and check-out features validated using geolocation for internship students at the Organization Division of the Regional Secretariat of Binjai. The main issue identified at the research site is the inefficiency and inaccuracy of attendance tracking, which is still conducted manually and prone to recording errors. To address this issue, the study adopted the Waterfall methodology, which includes the stages of requirements analysis, system design, implementation, testing, and maintenance. The results indicate that the developed attendance application can accurately record attendance by validating geographic locations. Key features implemented in the system include user authentication, data encryption to protect personal information, and geolocation validation to ensure attendance can only be recorded at authorized locations. System testing demonstrated high accuracy in recording attendance in areas with adequate GPS signals. However, in areas with weak signals, geolocation accuracy needs improvement. The application is also equipped with a reporting feature, enabling real-time monitoring of attendance data. Overall, this attendance system not only enhances the efficiency and accuracy of attendance tracking processes but also supports data transparency and security. Further development is recommended to improve performance in areas with weak signals and to incorporate advanced analytics features for attendance reporting.

**Keywords:** Attendance System, Web Application, Internship Student, Geolocation Validation

---

#### Corresponding Author:

Muhammad Fadlan Alamsyah

Universitas Islam Negeri Sumatera Utara; mfdlanss@gmail.com

---

*This is an open access article under the [CC BY-NC-SA](https://creativecommons.org/licenses/by-nc-sa/4.0/) license.*



### 1. INTRODUCTION

Internship activities are an integral part of developing students' skills and knowledge in the world of work. In the Organization Section of the Regional Secretariat of Binjai, the internship program not only aims to provide practical experience, but also to increase students' capacity to understand the dynamics of government bureaucracy. One important aspect in the implementation of internships is accurate and transparent attendance management, because the attendance of internship students directly contributes to the success of the planned program. However, the manual attendance process that is still used often faces obstacles, such as inaccurate recording, time-consuming data recapitulation process, and the potential for fraud. For this reason, a more modern, efficient, and reliable attendance

system is needed. The development of a web-based attendance system with check in and check out features validated using geolocation is an effective solution. This system allows internship students to take attendance independently by utilizing their digital devices, and their attendance will only be recorded if they are in a predetermined location. Thus, this system not only improves the accuracy of attendance data, but also facilitates the real-time monitoring process by related parties.

This research aims to develop a web-based attendance system for internship students in the Organization Section of the Regional Secretariat of Binjai, by integrating geolocation features as an effort to increase transparency and accountability of the attendance process. The implementation of this system is expected to support the effectiveness of the internship program and provide convenience for students and managers in monitoring attendance efficiently.

## **2. LITERATURE REVIEW**

The development of a web-based attendance system with check-in and check-out features using coordinate point validation has become a trend in various information technology studies. The implementation of geolocation technology is considered effective to improve accuracy and efficiency in recording attendance. Several relevant studies have shown that the use of geolocation technology can provide significant benefits in terms of accuracy and transparency of attendance data (Sidabalok & Setiawan, 2024). For example, emphasizing the role of \*Maps JavaScript API\* in improving the accuracy of web-based online attendance systems. Meanwhile, research on attendance systems for web-based conference activities proved that these systems can reduce human error in recording attendance.

Another study compared the effectiveness of coordinates generated by Google Maps with professional GPS devices. The results show that the use of GPS on smart devices is quite accurate in determining the user's position, but with a note that accuracy can decrease in areas with weak signals. This is in line with a study that compared distance calculation methods such as Euclidean, Haversine, and Manhattan in determining employee positions, which concluded that these methods can be used effectively depending on the needs of the application.

Research related to the development of other geolocation-based systems also shows that integrating GPS technology in internship information systems can improve the efficiency of internship data management and reduce the risk of data manipulation (Gunawan et al., 2021). Based on this literature review, your research that develops a web-based attendance system with check-in and check-out features using coordinate point validation in the Organization Section of the Regional Secretariat of Binjai has a strong foundation and is in a relevant trend (Adytia Permana & Jayadi, 2022). The implementation of this technology is expected to improve the weaknesses of the manual attendance system and support transparency and accountability in recording the attendance of interns.

### **2.1 Unified Modeling Language (UML)**

The Unified Modeling Language (UML) is a standard modeling language used to design and document software systems (Yunita et al., 2022). UML provides various diagrams that describe the structure, interactions, and behavior of a system.

1. UML functions as a communication tool among developers, designers, and other stakeholders to ensure that everyone understands the system's design.
2. Definition: UML is a set of graphical diagrams used to describe the specification, design, and documentation of software systems.

3. Benefits: UML simplifies the analysis and design of complex systems by providing clear visualizations. It enhances team communication, documents requirements, and reduces the risk of miscommunication.
4. Purpose: UML aims to facilitate the software development process, improve design efficiency, and provide standardized documentation throughout the software lifecycle.

## 2.2 Waterfall Method

The Waterfall method is a sequential software development model in which each stage must be completed before moving on to the next (Manu & Adrianus Benufinit, 2020). Its main stages include requirements analysis, system design, implementation, testing, and maintenance.

1. Function: The Waterfall method serves as a systematic framework for managing software development projects in a structured sequence.
2. Definition: Waterfall is a linear software development model emphasizing the completion of each phase before proceeding to the next.
3. Benefits: This method provides clear structure, comprehensive documentation at each stage, and allows easy tracking of project progress.
4. Purpose: The goal of the Waterfall method is to ensure that project requirements are well-understood from the start, and each phase is completed with high-quality standards before moving forward.

## 2.3 Use Case Diagram

A Use Case Diagram is one of the UML diagrams used to illustrate the interaction between users (actors) and a system (Larasati & Fajri Sa'ba, 2021). Delineates the interactions between users (actors) and the system, facilitating comprehension of the system's functionality from the viewpoint of users or external entities. A use case diagram largely comprises actors, which are external entities such as individuals, other systems, or devices that interact with the system, depicted by a simplistic human representation (stick figure). The additional element is the use case, which delineates the service or feature of the system to fulfil the requirements of the actor. An ellipse is illustrated, annotated with the function's designation. nationality. All these use cases often reside within the system boundary, a rectangular delineation that defines the system's scope. It shows how the system is utilized to meet user needs.

1. Function: The Use Case Diagram identifies system requirements from the user's perspective and illustrates the interaction between actors and the system.
2. Definition: A Use Case Diagram is a graphical representation of the system's functions (use cases) interacting with external actors.
3. Benefits: This diagram helps understand system requirements, enhances communication between developers and stakeholders, and facilitates testing and development planning.
4. Purpose: Its purpose is to define the system's scope, provide a high-level view of the system's functionality, and support effective requirement analysis.

## 3. METHODS

This research was conducted in the Organization Section of the Regional Secretariat of Binjai in the period August to September 2024, with interns as the object of research. This research uses the

Waterfall method for system development. This method adopts a linear and sequential software development approach, where each stage must be fully completed before proceeding to the next stage. This approach provides a structured and systematic flow in the system development process.

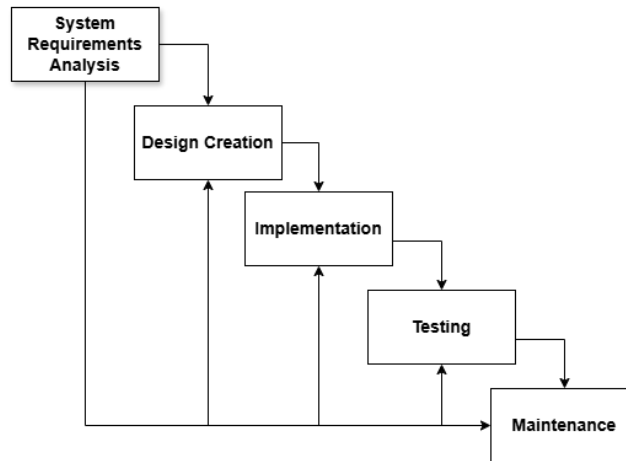


Figure 1. Waterfall Method

Figure 1 above illustrates the stages of the Waterfall model which presents a sequential approach to software development. This model includes a series of processes ranging from system requirements analysis, system design, implementation, testing, to system maintenance after completion. The advantage of the Waterfall model lies in a clear and organized development flow, making it easier for the team to follow each stage systematically. After obtaining a clear flow of the system to be developed, the next step is to create a diagram that describes the system as a whole. The Use Case Diagram of this system aims to describe the scope of the system as a whole. This process can be seen in Figure 2 below:

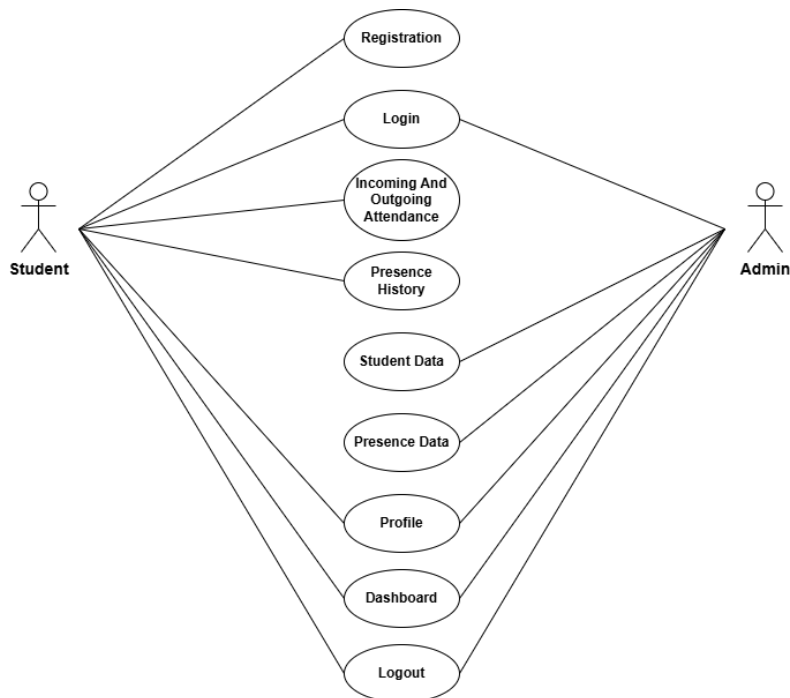


Figure 2. Use Case Diagram

Figure 2 above shows how the attendance system for apprentices and the entities involved in it will look like. From the general description above, the attendance system will then be developed. After the system is developed, testing will be carried out according to the Waterfall stage. Testing has the aim of knowing whether the attendance system based on the Check In and Check Out features made is in accordance with the research objectives or there are still errors or errors. The testing process uses the Black Box testing method which functions to check all aspects contained in the system are in accordance or not with their functions.

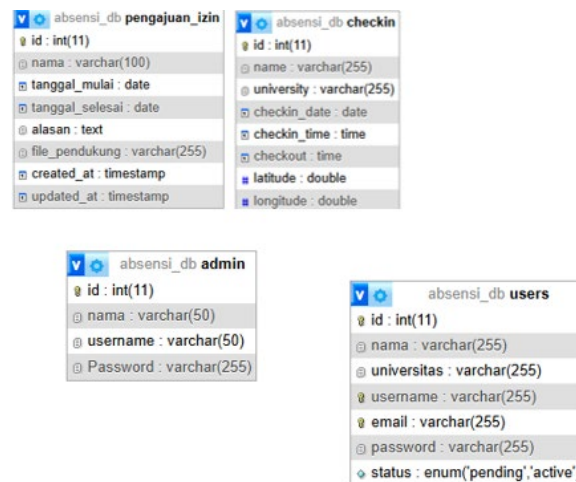


Figure 3. Database Design

Figure 3 show a database design for a web-based attendance system with four main tables: pengajuan\_izin, checkin, admin, and users. The pengajuan\_izin table records leave requests, including the name, dates, reason, and supporting files, while the checkin table stores attendance data such as check-in/check-out times and location coordinates (latitude, longitude).

The admin table is used for administrator authentication with attributes like username and password, while the users table stores user data, including name, university, email, status, and login credentials. This design supports key features like time and location-based attendance, leave requests with file attachments, and user management with admin authentication for system control.

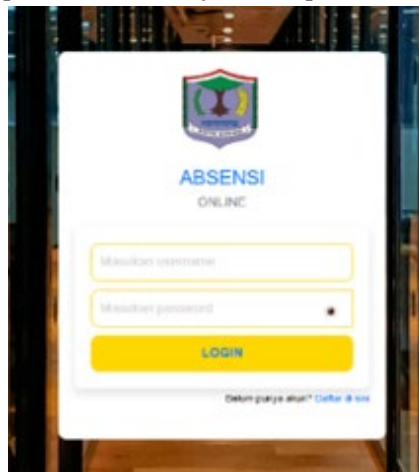
#### 4. RESULTS AND DISCUSSION

In this results and discussion section, we will explain in detail the appearance and features of the Web-Based Attendance System Design in the Organization Section of the Regional Secretariat of Binjai. Each feature and functionality will be described in detail, including how this system can increase efficiency in the check-in and check-out process of internship students with coordinate point validation.

This discussion focuses on how the attendance system designed is able to provide convenience and improve work efficiency for managers and student interns. The system is designed to ensure the accuracy of attendance data, speed up the data collection process, and reduce the potential for manual errors that often occur in conventional attendance. In addition, the use of this system is expected to improve the overall quality and effectiveness of operations in the Organization Section of the Regional Secretariat of Binjai. The effectiveness includes easy access to information, accuracy of attendance data, and increased productivity in managing the attendance of internship students.

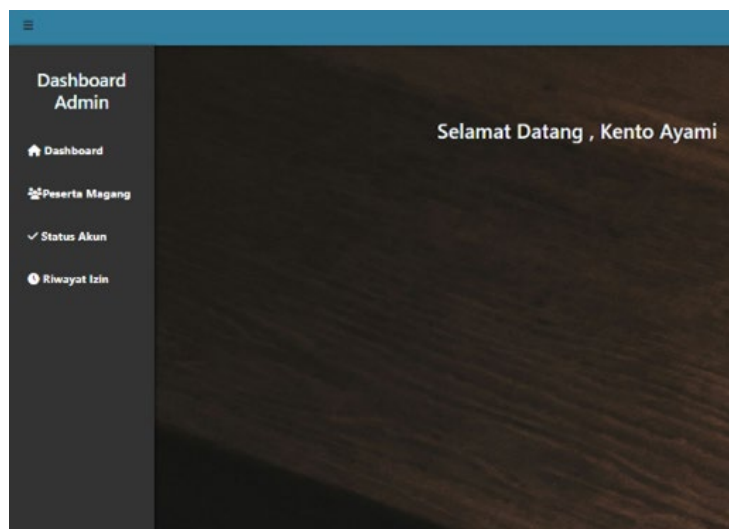
#### **4.1. User Interface**

The system at the first time accessed will display the login page according to the overview made earlier. The login page of the developed attendance system is presented as shown below:



**Figure 4.** Login Page Display

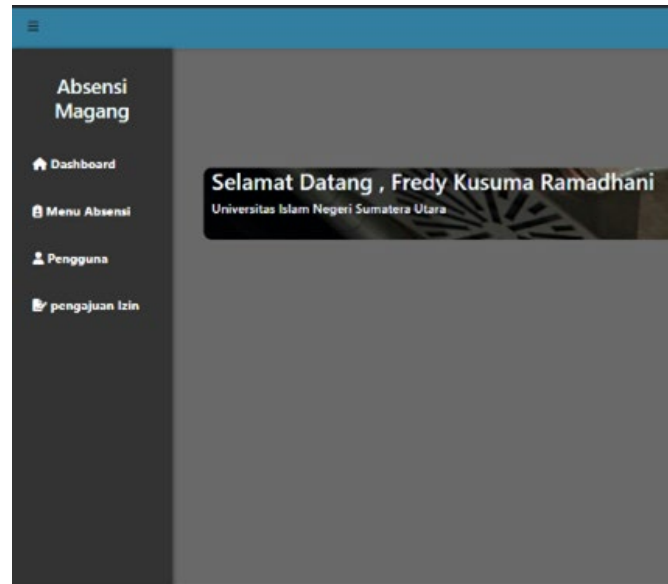
Figure 4 shows an online attendance login page for users. The central section displays a white login form with a logo at the top, followed by the title “Absensi Magang”. Below the title, there are two input fields labeled “Masukan username” (Enter username) and “Masukan password” (Enter password) for user credentials. A bright yellow “LOGIN” button is present to submit the information. At the bottom of the form, there’s a link labeled “Daftar di sini” (Register here) for users who don’t yet have an account. The background features a modern office hallway with glass partitions and wooden flooring, giving a professional and sleek visual appeal to the page.



**Figure 5.** Admin Dashboard View

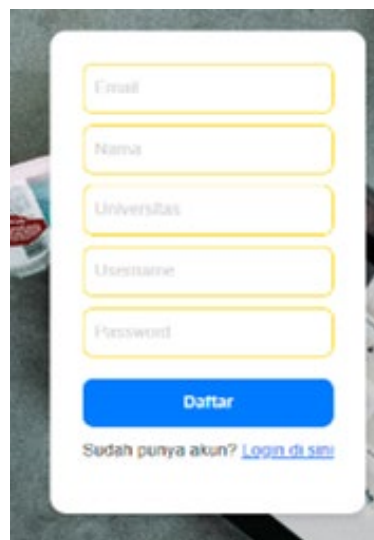
Figure 5 display is an Admin Dashboard for a web-based system with a simple interface and clear navigation. The sidebar on the left features four main menus: Dashboard to return to the main page, Intern Participants to view the list of interns, Account Status to check user account status, and Leave History to access leave or time-off records. In the center of the page, there is a welcome message, "Welcome, Kento Ayami", indicating the logged-in user. The page has a minimalist design with a

combination of a black sidebar, a blue header, and a content area featuring a dark wood texture background, giving it a professional and user-friendly appearance.



**Figure 6.** User Dashboard View

Figure 6 displays the login interface for the "Absensi Magang" application, which shows user information for Fredy Kusuma Ramadhani, a student at the State Islamic University of North Sumatra. There are two main buttons, "Check In" and "Check Out", which are likely related to an attendance or check-in feature. The top of the page contains the application's logo as well as the current date and time. Overall, the layout of this page is simple and user-friendly, with a focus on the check-in and check-out options for registered users.



**Figure 7.** Account Registration View

Figure 7 displays the user registration page for an online system, featuring a clean, centered registration form with fields for Email, Name, University, Username, and Password. The form includes a blue "Daftar" (Register) button for submitting user information and a link below it labeled "Login di sini" (Login here) for users who already have an account. The background showcases a workspace

setting with various objects like a smartphone, tablet, and grooming tools, creating a modern and professional aesthetic. This page allows users, particularly interns, to create accounts by inputting their credentials, enabling access to the system's features. The design is simple, user-friendly, and functional for a seamless registration experience.

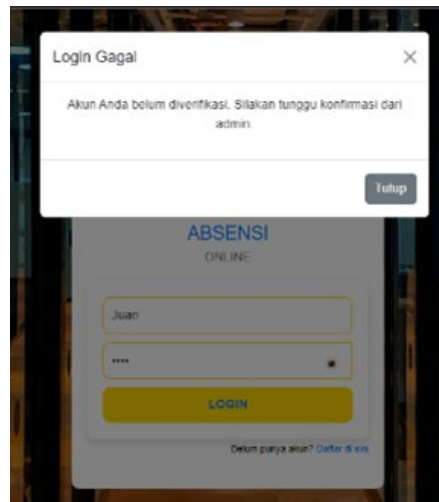


Figure 8. Login Failure Notification

Figure 8 displays the login interface of an application called "Absensi Magang". The page has two input fields, one for the username and one for the password. Below the password field, there is a yellow "LOGIN" button. At the bottom of the page, there is text that asks "Don't have an account? Register here." which is likely a link or button to sign up for a new account. Additionally, there is a pop-up dialog at the top of the page that displays the message "Your account has not been verified. Please wait for confirmation from the admin." Overall, this page appears to be the login page for an online attendance application, with features for logging in, signing up for a new account, and the account verification process by an admin.

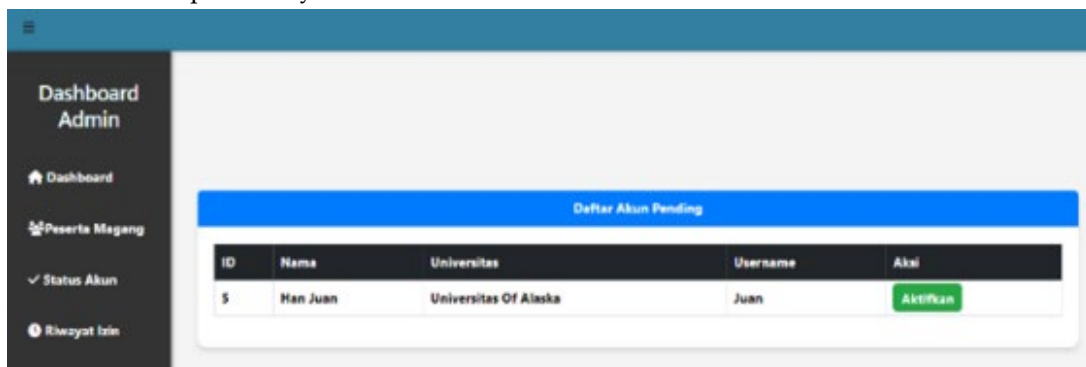
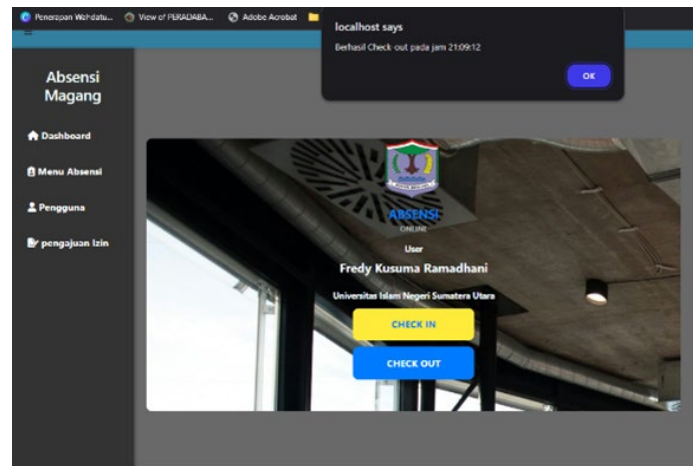


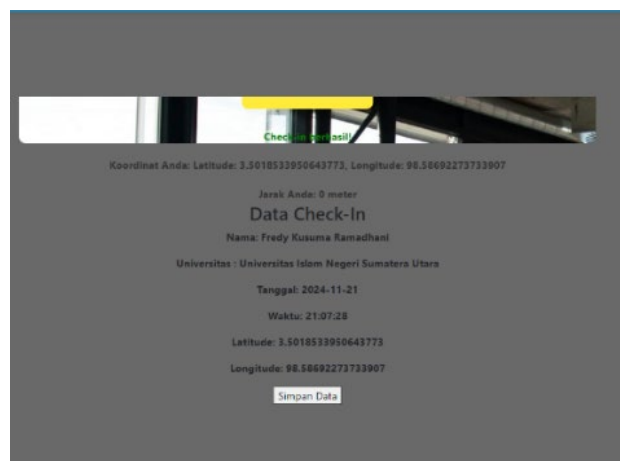
Figure 9. User Account Verification Menu

Figure 9 shows an admin page featuring a user account verification system in a web-based application. On the left sidebar, there are navigation menus such as Dashboard, Intern Participants, Account Status (active), and Leave History. The main section displays a table titled Pending Accounts List, which provides account details like ID, name, university, and username, with an action column containing a green "Activate" button to process account activation. The layout is simple and well-structured, making it easy for the admin to view and manage accounts awaiting verification.



**Figure 10.** Display of Check in and Check Out Features

Figure 10 shows an online attendance system page for internship participants with a simple yet functional design. The main section displays user information, such as the name, institution, and two primary buttons: CHECK IN (yellow) and CHECK OUT (blue), which are used to record attendance. On the left sidebar, there is a navigation menu consisting of Dashboard, Attendance Menu, Users, and Leave Submission, making it easier for users to access other features. Additionally, the system displays real-time information in the top right corner to ensure accurate attendance tracking. A pop-up notification appears at the top of the screen, confirming that the Check-out process was successfully completed at 9:09:12 PM, validating the user's attendance record automatically.



**Figure 11.** Attendance Successful Display

Figure 11 shows a successful check-in confirmation page for a user within a web-based system. At the top, there is a notification confirming the check-in, followed by details of the user's location, including Latitude (3.5018533950643773) and Longitude (98.58692273733907). The check-in information displays the user's name, Fredy Kusuma Ramadhani, their university, Universitas Islam Negeri Sumatera Utara, along with the Date (2024-11-21) and Time (21:07:28) of the check-in. Additional coordinates are repeated below, confirming the user's current location. At the bottom, there is a "Save Data" button, indicating the option to store the check-in details. The layout is clear and straightforward, providing accurate real-time data for attendance tracking purposes.

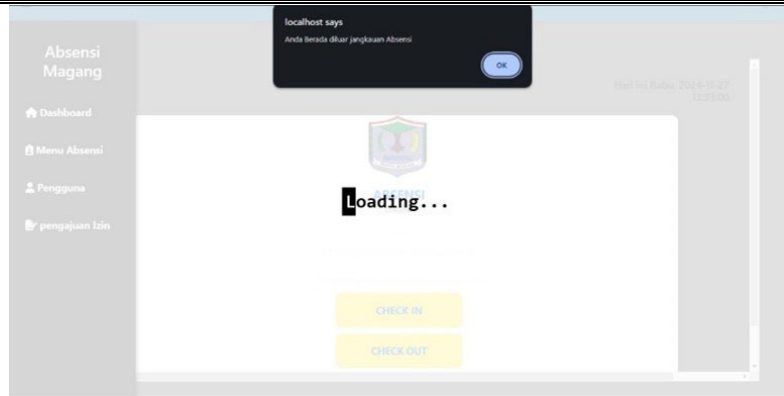


Figure 12. Absence Failure Display

Figure 12 show "Absensi Magang" application page displays a loading interface, with the text "Loading..." in the center of the screen and the app's logo above it. There are two large yellow buttons for "Check In" and "Check Out", allowing users to perform check-in and check-out attendance. In the top right corner of the screen, there is a message stating "You are outside the attendance range", which is likely related to a feature that monitors the user's location when using the app. The overall layout of this page is simple and focused on the core attendance check-in and check-out functionality.

#### 4.2. Blackbox Testing

The table below is Blackbox Testing or the stages of testing on features based on their functionality on the system.

Tabel 1. Blackbox Testing

Case	Scenario	Expected Results	Results
Login Screen	User enters correct username and password	User successfully logs into the system	Valid
Dashboard Page	After login, the user is directed to the dashboard page	The dashboard page is displayed with the main information of the system	Valid
Check in attendance	User accesses the "Check in" feature on the attendance page	The system records the check-in time	Valid
Check out attendance	User accesses the "Check out" feature on the attendance page	System records check-out time	Valid
Add user	Admin adds a new user through the input form	New user successfully added	Valid
validation of location	User tries to check in outside the allowed radius	The system rejects the check in and sends a notification	Valid

Case	Scenario	Expected Results	Results
license application	User fills out the permit application form in the system	System saves and sends notification to admin	Valid
License History	Admin accesses the "Permit History" menu to view the list of permits	The system displays a list of all users' permission applications	Valid

## 5. CONCLUSION

This study aimed to develop a web-based attendance system with check-in and check-out features validated using geolocation for internship students at the Organization Division of the Regional Secretariat of Binjai. The results indicate that the developed attendance application can accurately record attendance by validating geographic locations. Key features implemented in the system include user authentication, data encryption to protect personal information, and geolocation validation to ensure attendance can only be recorded at authorized locations. System testing demonstrated high accuracy in recording attendance in areas with adequate GPS signals. However, in areas with weak signals, geolocation accuracy needs improvement. The application is also equipped with a reporting feature, enabling real-time monitoring of attendance data. Overall, this attendance system not only enhances the efficiency and accuracy of attendance tracking processes but also supports data transparency and security. Further development is recommended to improve performance in areas with weak signals and to incorporate advanced analytics features for attendance reporting. Additionally, integrating this attendance system with a more comprehensive internship information system can enhance the overall efficiency and effectiveness of the internship program.

## REFERENCES

- Adytia Permana, B., & Jayadi, A. (2022). Aplikasi Presensi Online Menggunakan Validasi Jarak Lokasi Pengguna Berbasis Android (Study Kasus: Toko Yonix). *Jurnal Informatika Dan Rekayasa Perangkat Lunak (JATIKA)*, 3(1), 86–92. <http://jim.teknokrat.ac.id/index.php/informatika>
- Amrial Khoir, S., & Yudhana, A. (2020). Implementasi GPS (Global Positioning System) Pada Presensi Berbasis Android DI BMT Insan Mandiri. *Jurnal Sains Komputer & Informatika (J-SAKTI)*, 4, 9–17. <http://tunasbangsa.ac.id/ejurnal/index.php/jsakti>
- Chahyadi, F., Mahargarika, A., Suswaini, E., Raja Ali Haji, M., & Politeknik Senggarang, J. (2021). *Jurnal Sustainable: Jurnal Hasil Penelitian dan Industri Terapan* 53. 10(02), 53–58.
- Gunawan, R., Maulana Yusuf, A., Nopitasari, L., Stmik, R. 2 J., Kertabumi, N., 62, K., Kulon, K., Karawang, B., Karawang, K., & Barat, J. (2021). *Rancang Bangun Sistem Presensi Mahasiswa Dengan Menggunakan Qr Code Berbasis Android*. 14(1), 47–58. <http://journal.stekom.ac.id/index.php/elkompage47>
- Hendra Wibowo, G., Adi Prasetyo, J., & Dimiyati Ayatullah, M. (2021). *Rancang bangun aplikasi presensi berbasis geolokasi dan interval waktu*. 19(1). <https://doi.org/10.33795/eltek.v1712.xxx>
- Hutauruk, J. C. (2021). *Meningkatkan Hasil Belajar Materi Koordinat Suatu Titik Pada Koordinat Kartesius Dengan Penerapan Model Inquiry Based Learning (Ibl) Di Kelas Viii-3 Smp Negeri 4 Doloksanggul T.P. 2021/2022*.
- Kurnia Kasanova, M., Nurraharjo, E., Budiarmo, Z., Siswo, M., 12, U. 4, Lomba, J. T., No, J., Mugassari, K., Semarang, S., Semarang, K., & Tengah, J. (2021). PRESENSI SISWA BERBASIS RFID

- 
- TERINTEGRASI WEB DENGAN NOTIFKASI BOT TELEGRAM. In *Jurnal Informatika & Rekayasa Elektronika* (Vol. 4, Issue 2). <http://e-journal.stmiklombok.ac.id/index.php/jireISSN.2620-6900>
- Larasati, P. D., & Fajri Sa'ba, N. (2021). *Pramitha Dwi Larasati, Nur Fajri Sa'ba Perancangan Sistem Pelaporan Absensi Berbasis Web pada PT. Solar Control Specialist (SCS)*.
- Manu, G. A., & Adrianus Benufinit, Y. (2020). *PENGEMBANGAN SISTEM ABSENSI ONLINE BERBASIS WEB MENGGUNAKAN MAPS JAVASRIPTS API*.
- Mulyadi, E., Trihariprasetya, A., Gede Wiryawan, I., Teknologi Informasi, J., & Negeri Jember Jember, P. (2020). *PENERAPAN SISTEM PRESENSI MOBILE DENGAN MENGGUNAKAN SENSOR GPS (KLINIK PRATAMA X DI JEMBER)* (Vol. 9, Issue 1).
- Nilfaidah, N., Sa'ban Miru, A., & Lamada, M. (2021). *PENGEMBANGAN SISTEM ABSENSI MAHASISWA REALTIME MENGGUNAKAN PHP, MYSQL, SMS GATEWAY, DAN FRAMEWORK CODEIGNITER*.
- Prathivi, R., & Kurniawati, Y. (2020). *SISTEM PRESENSI KELAS MENGGUNAKAN PENGENALAN WAJAH DENGAN METODE HAAR CASCADE CLASSIFIER*. *Jurnal SIMETRIS*, 11(1).
- Putra Setiawan, R. (2021). *SISTEM INFORMASI MANAJEMEN PRESENSI SISWA BERBASIS MOBILE STUDY KASUS SMA N 1 SUNGKAI UTARA LAMPUNG UTARA*. *Jurnal Teknologi Dan Sistem Informasi (JTSI)*, 2(3), 119–124. <http://jim.teknokrat.ac.id/index.php/JTSI>
- Rachman, N., Muda, S., & Darat, P. A. (2024). *IMPLEMENTASI RUTE PATROLI MENGGUNAKAN EMBARCADERO DELPHI MENGGUNAKAN TOOL SHAPE YANG DISANDIKAN*. In *IJNRSM* (Vol. 2, Issue 3).
- Rosdiana, M., & Sutriyatna, E. (2023). *Penerapan Internet Of Things Pada Sistem Aplikasi Presensi Siswa Berbasis Web*. <https://journal.mediapublikasi.id/index.php/logic>
- Sidabalok, S., & Setiawan, A. (2024). *JEIS (JOURNAL ENGINEERING IN INDUSTRIAL SYSTEMS) Perancangan Model Alat Pengukur Suhu Titik Koordinat Ruang 3-Dimensi Berbasis Internet Of Things* (Vol. 1, Issue 6). <http://journal-live.ithb.ac.id/EIS>
- Sutoyo, I., Komalasari, Y., & Ayumida, S. (2023). *Perancangan Sistem Informasi Perekaman Presensi dan Absensi Siswa Menggunakan Model RAD*. In *Jurnal* (Vol. 5, Issue 1). <http://ejournal.bsi.ac.id/ejurnal/index.php/infortech58>
- Wardana, A., Azzahra Batubara, A., Wanandi, B. S., Muzaddidah, C., Andrea, K., & Hafizh, M. A. (2023). *207 Rancangan Desain Prototype RFID Pada Presensi Mahasiswa Menggunakan KTM Di Prodi Sistem Informasi UINSU* (Vol. 1, Issue 3). Online.
- Warzuqni, A. A., Putri Sabilla, D., Agustin, Z., & Rosyani, P. (2022). *ANALISA SISTEM PRESENSI KELAS MENGGUNAKAN PENGENAL WAJAH DENGAN METODE HAAR CASCADE CLASSIFIER*. *Jurnal Manajemen, Ekonomi, Hukum, Kewirausahaan, Kesehatan, Pendidikan dan Informatika*, 1(1). <https://journal.mediapublikasi.id/index.php/bisik>
- Yunita, H., Ma'ad Junaidi, H., Akbar, A., & Febriyanti4, N. R. (2022). *Pemanfaatan Teknologi Simple Scan pada Aplikasi Presensi Awak Kapal Berbasis Web*. *Jurnal Ilmiah Teknik Informatika dan Sistem Informasi*, 11, 1–12.
- Yusuf, D., Supriyadi, S., & Kunci, K. (2022). *PENERAPAN SISTEM KEHADIRAN MAHASISWA BERBASIS WEB MENGGUNAKAN OPENSTREETMAP*. 16. <https://journal.uniku.ac.id/index.php/ilkom>