



# Student Internship Control System Based on Geolocation and QR Code

Made Pasek Agus Ariawan<sup>1</sup>, I Made Ari Dwi Suta Atmaja<sup>2</sup>,  
Ida Bagus Adisimakrisna Peling<sup>3</sup>, and I Wayan Aries Agetia<sup>4</sup>

<sup>1,2,3</sup> Information Technology Department, Politeknik Negeri Bali, Bali, Indonesia

<sup>4</sup> Tourism Department, Polteknik Negeri Bali, Bali, Indonesia  
pasekagus@pnb.ac.id

**Abstract.** In today's digital era, the Diploma 2 (D2) Computer Network Administration program plays a vital role in preparing graduates to contribute to the ICT industry. The success of this program, however, relies heavily on the effectiveness of internship experiences, which serve as a bridge connecting theory with practice. Internships provide students with essential skills and insights, yet supervision and management remain persistent challenges. Issues such as monitoring student attendance, tracking their locations, and accurately evaluating performance often weaken the program's outcomes and limit students' opportunities to maximize their learning. To address these challenges, this study proposes the design and development of a Geolocation-Based Control System for managing internships of D2 Computer Network Administration students. The system enables real-time monitoring of students' locations, ensuring accountability and transparency for both universities and internship providers. Beyond monitoring, it functions as a collaborative platform that supports students with features such as smart travel planning, helping them arrive safely and punctually at their internship sites. This research highlights not only technological innovation but also educational advancement. By improving the quality of internship supervision, the system enhances efficiency, accountability, and student preparedness. Ultimately, it strengthens the link between academia and industry, ensuring graduates are better equipped to face the competitive demands of the ICT workforce.

**Keywords:** Geolocation, Internship, Information System

## 1 Introduction

The rapid development of Information and Communication Technology (ICT) has had a significant impact on various sectors, including education. The Diploma 2 (D2) Computer Network Administration program, one of the most popular programs, demonstrates the important role of ICT in preparing competent graduates. This program emphasizes not only mastery of theory but also practical industry-oriented experience through a mandatory internship program.

The internship program is a crucial element in bridging the gap between theoretical learning and practical application in the workforce (Chairunissa & Rahmayanti, 2023).

© The Author(s) 2025

A. A. N. G. Saptika et al. (eds.), *Proceedings of the International Conference on Sustainable Green Tourism Applied Science - Engineering Applied Science 2025 (ICOSTAS-EAS 2025)*, Advances in Engineering Research 280,

[https://doi.org/10.2991/978-94-6463-878-3\\_42](https://doi.org/10.2991/978-94-6463-878-3_42)

However, supervision and management of internship programs often face significant challenges. One of the main obstacles is the lack of an efficient system to monitor the location and activities of students during their internships (Yulianto & Firdaus, 2021). This limitation hinders accurate performance assessment and reduces the overall effectiveness of the internship program.

Geolocation technology offers a potential solution to these challenges. A geolocation-based control system allows real-time monitoring of student locations, facilitating more effective supervision by universities and internship institutions (Ngulum et al., 2024). This system is expected to improve student accountability and provide more precise data for performance evaluation.

Furthermore, a geolocation-based system can assist students in planning their trips to internship locations by providing information on optimal and safe routes. This logistical support enables students to focus more on their tasks and responsibilities, minimizing potential disruptions.

Based on the need for efficient internship management and the potential of geolocation technology, this research aims to design and develop a “Geolocation-Based Control System for D2 Computer Network Administration Student Internships”. The resulting system is expected to benefit students, universities, and internship institutions. This study seeks to contribute positively to enhancing the quality of education and student internship experiences, thus preparing graduates who are better equipped to face the demands of a competitive job market. The development and implementation of this system are projected to result in significant improvements in the overall effectiveness and accountability of the internship program.

## **2 Methodology**

### **2.1 Related Research**

Yulianto and Firdaus developed a GPS-enabled web and mobile system to modernize internship attendance reporting, allowing supervisors to monitor students' locations and reasons for off-site check-ins, improving oversight and efficiency (Yulianto, 2021). Baharuddin and Ulfah created a web-based Internship Management Information System using UML design and R&D methods, validated to be practical, effective, and efficient for students, supervisors, and administrators (Baharuddin, 2021). Anggita and Suwardoyo designed an Android attendance app with geolocation and fingerprint authentication, enhancing accuracy and discipline in employee attendance, though device specifications affected geolocation accuracy (Arfah, 2022). Turmudi and Rosyani implemented a web-based online attendance system with photo and geolocation verification at PT. Logistic International aims to address remote work attendance challenges, aiming for long-term habitual use and system improvement (Turmudi, 2023). Supiana developed an Android app using the Waterfall method to monitor student activities and locations during the pandemic, targeting increased technology readiness and educational use (Supiana, 2022). Tamtelahitu applied QR-Code and geolocation technology in an integrated mobile and web system to facilitate

and verify student attendance, confirmed functional through Blackbox testing (Tamtelahitu, 2021).

## 2.2 Waterfall Model

The waterfall model is the earliest SDLC approach used in software development. This model describes the software development process in a linear and sequential flow; therefore, it is also called a linear-sequential lifecycle model. This means that each phase in the development process only begins if the previous phase has been completed. In the waterfall model, the phases do not overlap. The waterfall approach was the first SDLC model widely used in software engineering to ensure project success (Fitria et al., n.d.).

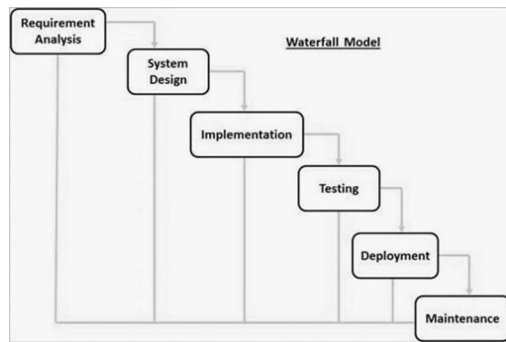


Figure 1. Research Stages

## 2.3 Geolocation

Geolocation is a technology used to determine the physical location of an object, such as a mobile device, computer, or user, on the Earth's surface. This technology utilizes various methods to identify the position (Rahman et al., 2023). Examples of geolocation technology include GPS (Global Positioning System), a satellite navigation system that provides high-accuracy location information (Perkasa et al., 2019). Wi-Fi, which uses signals from nearby Wi-Fi networks to determine location, especially in urban areas where GPS signals may not always be available (Sinaga et al., 2024); Cell Tower Triangulation, which uses information from nearby cell towers to estimate device location (Vendyansyah, 2024); and Bluetooth, which in some applications can be used to determine close-range location, such as inside buildings (Rizaldi et al., 2020).

### 3 Result and Discussion

#### 3.1 Result

**Requirement Analysis.** An internship information system is a digital infrastructure designed to support the management of all activities within an internship program in an integrated manner. Through this system, various stakeholders such as students, mentors, lecturers, and administrators can interact on a single platform to record, monitor, and evaluate the internship activities carried out.

With the internship information system, students can easily record attendance and receive internship tasks from mentors in real-time. On the other hand, mentors can assign activities, monitor student progress, and validate completed tasks. Supervising lecturers can also access student activity data, perform assessments, and print internship activity reports and evaluation reports more efficiently.

This system is designed to create a more effective, transparent, and accountable internship administration experience for all parties involved. With technology integration, every process in the internship program can run faster, more accurately, and be well-documented. Thus, the internship information system not only facilitates the management of internship activities but also becomes an important part of improving the quality of practice-based learning in higher education.

**System Design.** Use Case. This Use Case Diagram illustrates the interaction between system users and the functionalities available in the Internship Information System. The diagram involves four main actors: Admin, Lecturer, Field Mentor, and Student, each having different roles and access rights within the system.

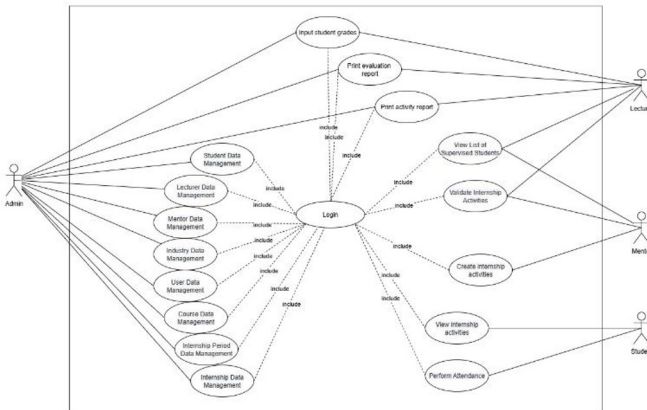


Figure 2. Use Case Design System

*Admin.* Logs in, manages master data (students, lecturers, mentors, industries, users, courses, internship periods, internship data), inputs student grades, and prints activity and evaluation reports.

*Student.* Logs in, views internship activities created by mentors, records daily attendance for these activities, and views grades from lecturer evaluations.

*Field Mentor.* Logs in, views the list of mentees, creates internship activities for students, and validates internship activities.

*Lecturer.* Logs in, views the list of mentees, monitors and validates student internship activities, inputs student grades, and prints activity and evaluation reports.

Each actor must first log in, which serves as the main entry point, before they can use other features. The login process is mandatory and used as the basis of authentication in the system.

**Enhance Entity Relationship (EER).** This database schema illustrates the structure and relationships between the main tables in an academic system, which include data on students, teachers, courses, attendance, grades, and internships. Each table is interconnected using primary and foreign keys to manage related information in an integrated manner. The students’ table holds personal data and links to attendance and internships. The teachers’ table contains instructor information tied to courses and supervision. In contrast, the courses and grades tables manage academic performance records. This system enables efficient monitoring of attendance, internship management, and student grading within a well-organized database framework.

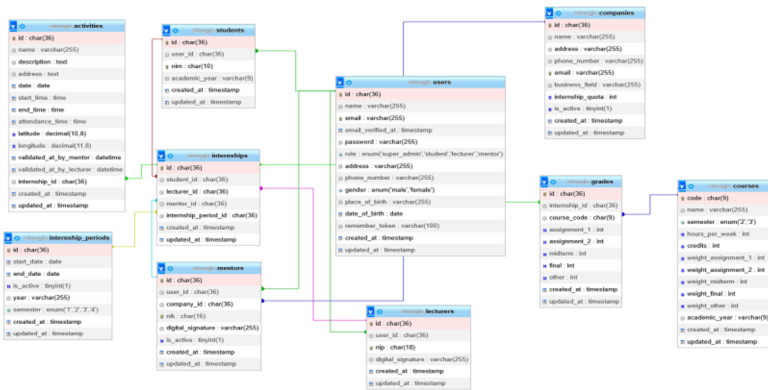


Figure 3. Enhance Entity Relationship (EER)

### Implementation

*Geolocation.* The implementation of the Google Maps API for automatic attendance involves combining the browser’s Geolocation API to detect students’ geographic positions in real-time during attendance recording. When students access the attendance page, the application requests permission to obtain location data in the form of latitude and longitude coordinates. This data can then be directly processed and sent to the

backend server to be stored along with the attendance time and student identity. In this way, the location of the internship students' attendance is automatically recorded without requiring manual input. Student Attendance page

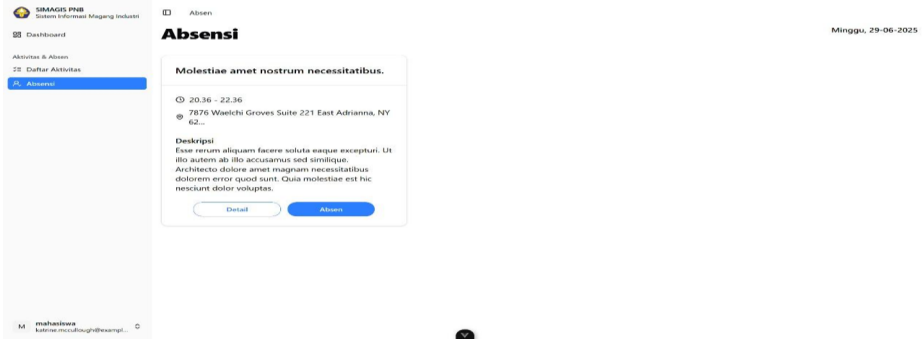


Figure 4. Implementation Geolocation

QR Code. Implementing QR Code to replace manual signatures in internship student administration can be done by assigning each student a unique QR Code containing personal and internship information; this QR Code is then scanned by the admin using a specialized application to digitally verify attendance or document approval, making the administration process faster, more accurate, and efficient without the need for physical signatures, while also facilitating real-time monitoring and reporting with secured data.

21	2025/08/09	11:43 - 15:43	Esse quo expedita sapiente.	Quos ipsum queraet delectus est architecto rem adipisci. Et quia alias enim sit placet qui corporis. Minus architecto voluptates commodi et et.
22	2025/08/10	17:27 - 20:27	Autem adipisci et cumque.	Repellat necessitatibus dolor earum commodi incidunt sit ex. Dolorem rerum pariatur distinctio rerum minus soluta. Iste tempore ex voluptatum. Quae neque quod omnis debitis.

Bukit Jimbaran, 11 Juli 2025



Ketua Program Studi D2 Administrasi Jaringan Komputer  
 Jurusan Teknologi Informasi, Politeknik Negeri Bali  
  
 NIP. 000000000000000000

Figure 5. QR Code Implementation

*Testing.* This testing method emphasizes the verification of input and output behavior without analyzing the internal program logic. Table 1 summarizes the test cases, procedures, expected outcomes, and validation results, providing a comprehensive overview of the system's performance.

**Table 1.** Blackbox Testing

No.	Feature	Test cases	Test steps	Expected output	Validation results
1	Student Login	Login with a valid account	Enter a valid student account	Login successful	Valid
2	Student Login	Login with an unregistered account	Invalid student account input	Login failed, display an error message	Valid
3	View Activity	View daily activity list	Login as a student, go to the activities page	The list of activities is displayed	Valid
4	Daily Attendance	Conduct attendance based on activities	Select the activity and fill in the attendance	Attendance is saved and confirmed	Valid
5	Mentor Login	Login with a valid account	Enter a valid mentor account	Login successful	Valid
6	Mentor Login	Login with an unregistered account	Invalid mentor account input	Login failed, display an error message	Valid
7	View Student List	View all students under guidance	Login as a mentor and go to the student registration page.	The complete list of students is displayed	Valid
8	Daily Activity Input	Input new activity	Enter daily activities for students	Saved activities	Valid
9	Activity Validation	Validation of student activities	Select a student activity and validate it	Activity status changes to validated	Valid
10	Lecturer Login	Login with a valid account	Enter a valid lecturer account	Login successful	Valid
11	Lecturer Login	Login with an unregistered account	Invalid lecturer account input	Login failed, display an error message	Valid
12	View Student List	View the list of interns	Login as a lecturer and open the student page	The complete list of students is displayed	Valid

13	Advanced Validation	Validation of student activities that mentors have validated	Select activity and advanced validation	Activity status changes to valid	Valid
14	Providing Value	Give grades based on attendance and activity	Input attendance and activity values	Stored value	Valid
15	Print Activity Report	Print validated activity report	Click print report	Printed activity report with valid data	Valid
16	Print Value Report	Print student grade reports	Click print value report	Printed value report with valid data	Valid
17	Admin Login	Login with a valid account	Enter a valid admin account	Login successful	Valid
18	Admin Login	Login with an unregistered account	Invalid admin account input	Login failed, display an error message	Valid
19	Manage Master Data	Add/Edit/Delete user data, students, lecturers, mentors, industry partners, courses, internship periods	Make changes to master data	Changes saved correctly	Valid
20	Internship Data Registration	Internship data registration based on students, industry, lecturers, and internship period	Complete internship data input	Internship data is stored	Valid
21	Providing Value	Give grades based on attendance and activity	Input attendance and activity values	Stored value	Valid
22	Print Value Report	Print student grade reports	Click print value report	Printed value report with valid data	Valid
23	Print Activity Report	Print mentor and lecturer validation activity reports	Click print activity report	Printed activity report with valid data	Valid

### 3.2 Discussion

The tested system encompasses various essential features that serve the needs of internship students, mentors, lecturers, and administrators in managing the internship process in an integrated manner. Initially, testing focused on the login functionality for each user role. The system was able to process logins with valid accounts and reject

unregistered accounts by displaying appropriate error messages, indicating successful management of security and user access.

Subsequently, the system was tested for features related to managing the students' daily activities. Students could view the list of daily activities and record attendance, which was then properly stored. Mentors could input daily activities and validate the students' activities. This validation was carried out in stages, first by the mentor and then further validation by the lecturer, reinforcing the accuracy and authenticity of the activity data.

Regarding data management, both mentors and lecturers were able to view complete lists of students and internship participants. Administrators have broader roles with the ability to add, edit, and delete master data such as student data, lecturer data, mentors, industry partners, and internship periods. Internship data registration, which involved a combination of students, industry, lecturers, and internship periods, was successfully performed and stored properly.

The system was also capable of assigning grades based on student attendance and activities, with these grades being stored accurately. The features for printing activity reports and student grade reports proved to produce valid data and could be printed according to needs, whether reports of activities validated by mentors and lecturers or student grade reports.

Overall, the test results indicate that the system has operated well and stably, meeting all main functional requirements without significant issues found. The system provides a comprehensive and effective solution for managing the internship process from various aspects, starting from user authentication, input and validation of activities, grading, to report printing. Thus, this project is ready for further implementation stages or wider usage.

## 4 Conclusion

In conclusion, the Diploma 2 (D2) Computer Network Administration program plays a vital role in preparing students for the ICT industry by bridging theoretical knowledge with practical internship experience. However, traditional internship supervision methods face challenges such as inadequate monitoring and performance assessment. This research introduces an innovative geolocation-based control system designed to enhance the management and oversight of internships in real time. The system not only improves accountability, efficiency, and transparency but also supports students with features like smart travel planning. Comprehensive testing confirms that the system effectively meets all functional requirements, including secure access, activity tracking, validation, grading, and reporting. This solution represents a significant advancement in internship program management, poised to improve educational outcomes and better prepare students for competitive workforce demands, benefiting students, educational institutions, and industry partners alike.

## References

- Arfah, A. A. & Suwardoyo, U. (2022). Aplikasi absensi karyawan menggunakan geolocation dan finger print berbasis Android. *Jurnal Sintaks Logika*, 2(2). <https://doi.org/10.31850/jsilog.v2i2.1733>.
- Baharuddin, M. R., & Ulfah, U. (2021). Pengembangan sistem informasi manajemen pelaksanaan magang FKIP UNCP. *Jurnal Literasi Digital*, 1(1). <https://doi.org/10.54065/jld.1.1.2021.6>.
- Bahrul N, M., Rico H, S., & Arif, A. I. (2024). Implementasi teknologi geolocation dan foto realtime untuk optimalisasi sistem absensi guru di MI Nurul Huda. *Jurnal Ilmu Komputer dan Sistem Informasi (JIKOMSI)*, 7(2), 341-348. <https://doi.org/10.55338/jikomsi.v7i2.3801>
- Chairunissa, D., & Rahmayanti, H. (2023). Membentuk kesiapan kerja mahasiswa melalui program magang. *Journal Of Engineering Education and Pedagogy*, 1(1), 1–7. <https://doi.org/10.56855/jeep.v2i1.683>.
- Fitria, O., Hasanah, N., Pd, M., & Untari, R. S. (2020). *Buku ajar rekayasa perangkat lunak*. Umsida Press, Universitas Muhammadiyah Sidoarjo.
- Hakim, A. R., Atmaja, D. M. U., & Haryadi, D. (2023). Analisis dan perancangan sistem informasi e-jahit menggunakan location based services (LBS) Berbasis Mobile Apps. *Journal of Informatics and Communication Technology (JICT)*, 5(2), 28–43. [https://doi.org/10.52661/j\\_ict.v5i2.207](https://doi.org/10.52661/j_ict.v5i2.207)
- Perkasa, P. (2019). Use of the Global Positioning System (GPS) for a basic survey of students. *Balanga: Jurnal Pendidikan Teknologi dan Kejuruan*, 7(1), 22–33. <https://doi.org/10.37304/balanga.v7i1.553>.
- Rizaldi, B., Pambudi, D. S., & Bariyah, T. (2020). Implementation of Bluetooth low energy technology and trilateration method for indoor route search. *Juti Jurnal Ilmiah Teknologi Informasi*, 18(2), 57. <https://doi.org/10.12962/j24068535.v18i2.a897>.
- Sinaga, A. P., Syahputra, I., Melati, N., & Nurbaiti, N. (2024). Optimalisasi jaringan Wifi (wireless fidelity) sebagai fasilitas pendukung akademik mahasiswa (studi kasus di UINSU). *Cognoscere Jurnal Komunikasi dan Media Pendidikan*, 2(4). <https://doi.org/10.61292/cognoscere.244>.
- Supiana, N. (2022). Pengembangan aplikasi geolocation untuk monitoring lokasi mahasiswa selama pandemi berbasis Android menggunakan metode waterfall (Studi kasus: STMIK Insan Pembangunan). *Jurnal Khatulistiwa Informatika*, 10(1). <https://doi.org/10.31294/Jki.V10i1.11741>.
- Tamtelahitu, T. M. (2021). Perancangan sistem absensi pintar mahasiswa menggunakan teknik QR code dan geolocation. *JUPI (Jurnal Ilmiah Penelitian Dan Pembelajaran Informatika)*, 6(1). <https://doi.org/10.29100/jupi.V6i1.1894>.
- Turmudi, I., & Rosyani, P. (2023). Perancangan presensi online menggunakan foto dan geolocation guna meningkatkan kedisiplinan pegawai berbasis website (studi kasus: PT. A Logistic International). *Logic: Jurnal Ilmu Komputer dan Pendidikan*, 1(3).
- Vendyansyah, N., & Wibowo, N. S. A. (2024). Penentuan rute terdekat dengan algoritma Haversine menggunakan location based service. *Jurnal Informatika Teknologi dan Sains (Jinteks)*, 6(1), 46–51. <https://doi.org/10.51401/jinteks.v6i1.3811>.

Yulianto, H. D., & Firdaus, R. B. (2021). Perancangan sistem informasi monitoring magang. *IJIS - Indonesian Journal on Information Systems*, 6(2). <https://doi.org/10.36549/ijis.V6i2.144>.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

