Attendance System with Near Field Communication Web-based and IoT

1st Eggi Julian
Department of Information Management
STMIK Sumedang
Sumedang. Indonesia
egijulian@stmik-sumedang.ac.id

2nd Yayan Cahyan
Department of Information Management
STMIK Sumedang
Sumedang. Indonesia
yayancahyan@stmik-sumedang.ac.id

Abstract*— The application and implementation of student attendance conventionally using paper media in universities, especially STMIK Sumedang has several problems, including disruption of the lecture process with circulars of absent documents, students often taking advantage of loopholes and working together with other students to commit fraud, for example, students who attend classes. class, often sign the attendance of friends who are not present in lectures, then there is the possibility of damage and loss of absent documents, the occurrence of human errors in the process of recapitulating attendance data, and the amount of time wasted using this method and the difficulty of quickly and accurately getting attendance data for evaluation needs which are running. Attendance for lecturers is not much different from students because it is still done conventionally. The fingerprint-based employee attendance has several weaknesses, such as the possibility of employees forgetting to do a finger scan at the beginning of work or the end of work, the absence of details of the work carried out by employees during working hours. This study offers a solution to overcome these problems, namely by designing a Web-based application that can record attendance data more easily with an attendance intermediary device with a microcontroller-based IoT. The method used is the waterfall, the steps taken include the method of collecting data on the current system, identification and analysis of system and user requirements, system design based on studies, designed with the PHP programming language and MySQL database with the addition of Laravel Framework and Vue.js as application formation. The proposed. The Internet of Things (IoT) microcontroller is used as a reader and sender of data for validation that is integrated into the system. The test is planned to be carried out using the simulation method from several data from students, lecturers, employees, and course schedules so that it can be used as a reference for monitoring and evaluating the performance of the Academic.

Keywords— Attendence System, Near Field Communication, IoT

I. INTRODUCTION

Attendance is one of the important elements in lecture activities, namely as an attendance recorder. The attendance list is proof that the student has attended a lecture. The number of attendance is a consideration for lecturers to determine the value for students. The application and implementation of student attendance conventionally using paper media at STMIK Sumedang has several problems such as disrupting the lecture process with circular absent documents, students often take advantage of loopholes and collaborate with other students to commit fraud, for example students who attend class, often sign the attendance of their friends who not attending lectures, then the possibility of damage and loss of absent documents, the occurrence of human errors in the process of recapitulating attendance data and the amount of time wasted using this method and the difficulty of quickly and accurately obtaining attendance data for ongoing evaluation needs. In addition, the number of student attendance is a requirement for students to be able to take the Final Semester Examination (UAS), which cannot be less than 75% of all lecture meetings, so that attendance recapitulation is very important for students to get final grades. Attendance for lecturers is not much different from students because it is still done conventionally. The fingerprint-based employee attendance has several weaknesses such as the possibility of employees forgetting to do a finger scan at the beginning of work or at the end of work, the absence of details of the work carried out by employees during working hours, etc. Not much different from student absenteeism, data manipulation may also occur. The recapitulation of the entire attendance of the whole which is also done manually and of course takes a long time because it has to enter a lot of data. One of the performance measurements of employees and lecturers is attendance [1]. Thus, the current attendance process is still less effective and efficient, so it requires a system or application that can process attendance for students, lecturers and employees that can reduce these problems. The development of technology and information systems today can make it easier for us in various ways, such as in the attendance system which is much more effective. Many institutions and universities have or are developing an effective and efficient attendance system such as using a Web-based system and an IoT Microcontroller. By using the system created this will help overcome existing problems. Students, lecturers and employees who will be referred to as users here will be able to take attendance only by opening the web that has been set on a schedule. Each user will have different access rights according to their status or level. In addition, this system will simplify the attendance recapitulation process so that it will save time and effort.

II. LITERATURE REVIEW

Attendance is a way to find out how far the level of work discipline is, whether people who work are able to obey the applicable regulations. Attendance is an element of discipline that aims to improve discipline in an institution. Attendance

can help improve the quality and service of an institution. The use of absenteeism means that there is discipline at the place concerned and assessing the work system in that place is of good quality [1][2][3]. The database is organized in such a way that a computer program can quickly select the desired data. The database can be likened to an electronic filing system. Traditional databases consist of fields, records, and files. Fields are items certain of the information; record is a set of fields; and file is a collection of records[4]. Laravel is a PHP Framework (PHP Hypertext Preprocessor) released under the MIT license, built with the MVC (Model, View, Controller) concept. Laravel is a PHP Framework created by Taylor Otwell and first released in 2011. Laravel has many modern features that help in the web development process such as artisan, blade template engine, database migration, pagination, and eloquent ORM (Object Relation Mapping)[5]. Vue.js is a progressive JavaScript framework that is used to build a user interface with reference to the MVC (Model, View, Controller) architecture. Vue.js is an open-source project with an MIT license that was created by Evan You in February 2014. One of the features offered by Vue.js is System Reactive Data Binding which functions to keep data and DOM (Document Object Model) bound together. same[6]. This web-based research on absenteeism has been carried out by several researchers in the 2017-2020 period. In research [7][8][9][10] discussing attendance using RFID and NFC media, the combination of these media is also used in this study, reading the ID is used because it has an ID that has a high level of security. The use of Cloud and Location Base [11][12][13] is also used to determine which access is passed by the user in carrying out their activities, thereby minimizing the use of misused access.

The waterfall method is used in research because it is an appropriate method within the scope of research or writing systems. The waterfall method provides a sequential, structured and systematic software lifeflow approach starting from analysis, design, implementation, deployment and maintenance as shown in Figure 1.

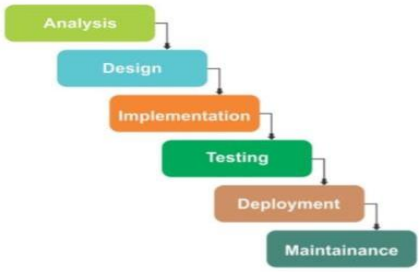

Figure 1. Waterfall Method

Based on the waterfall method in Figure 1 used in the study, the author describes the research method in Figure 2 with details of the following stages:

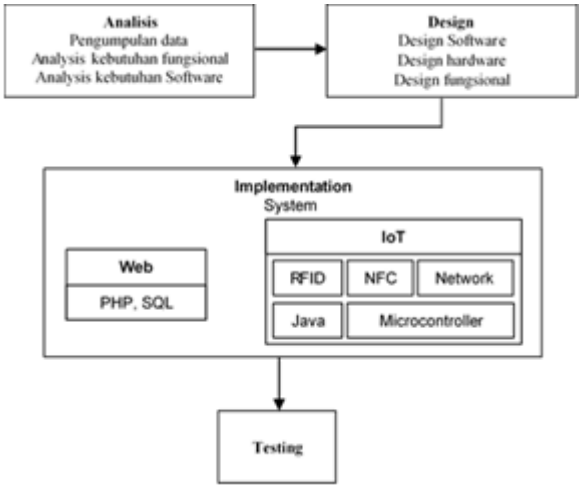

Figure 2. Research Method

Data collection techniques are by interviewing, observing, and studying all the documents used to carry out attendance activities. In designing the application, the Waterfall method will be used which consists of several stages, namely as follows:

A. Analysis, analyzing the existing system and the system to be developed, and noting the needs that must be met by the program to be built. In this phase, it must be done in detail so that the analysis made can produce a complete design. This stage aims to determine the solutions obtained from these activities. System analysis includes data collection, agency overview, analysis of current academic information systems, problems in the academic system, and problem solving proposed by the author.

There are several needs analysis that will be carried out in this research process, namely:

1. Analysis of functional requirements

2. Software requirements analysis

B. Design, At this stage the design of software, hardware and functional designs of the system will be made following the results of the analysis carried out. From interface design to function design, follow the results of the analysis. Consists of the main activities of modeling the design process including database design, system design, display design, hardware design and system function integration.

C. Implementation, at this stage the function design and interface design are converted into program codes, but the resulting program code is still a module that is not yet integrated. For programming the IDE used is android studio and visual studio code, while the programming language used is Kotlin/java and PHP, then for the database using MySQL and hardware model implementation, namely assembling IoT microcontroller components, RFID (Radio frequency identification) and NFC (Near Field Communication),

D. Testing, at this stage the models generated from the implementation are integrated so as to form a system that is in accordance with the analysis. And do testing to find out whether the software and hardware that are made are in accordance with the function design and testing the interface design on the software.

E. Deployment, after testing, the next stage is launching the application to the public so that it can be used by employees and students to find references and become a place to share information about scientific works.

F. Maintenance, after launching the application, maintenance is carried out as needed if there is a problem that occurs then maintenance is carried out but this maintenance is not limited if there is a problem, if the system requires updating then perform maintenance with approval.

III. Result And Discussion

1. Obtained Data
   a. Student Data
   b. Course Data
   c. Lecturer Data
   d. Employee data
2. Analysis & Design
   a. Current Attendance Process Flowchart
   b. Lecturer attendance is done on the Lecturer Attendance system called LMS
   c. Employee Attendance is done using Fingerprint tool
   d. Student attendance before the pandemic was carried out in the conventional way, namely by signing the attendance list that had been made by the institution
   e. Student attendance is carried out on the campus e-learning system

This study offers a solution to overcome these problems, namely by designing a Web-based application that is able to record attendance data more easily with attendance intermediary devices with microcontroller-based IoT. The method used is the waterfall, the steps taken include the method of collecting data on an ongoing system, identification and analysis of system and user requirements, system design based on studies, designed with the PHP programming language and MySQL database with the addition of Laravel Framework and Vue.js as application formation. The proposed. The Internet of Things (IoT) microcontroller is used as a reader and sender of data for validation that is integrated into the system. The test is planned to be carried out using the simulation method from several data from students, lecturers, employees and course schedules, so that it can be used as a reference for monitoring and evaluating the performance of the academic side.

Student attendance applications, lecturers and employees can input admin, users (students, lecturers, employees), by filling in name, email, password and roles data. User registration will be used to login the application.

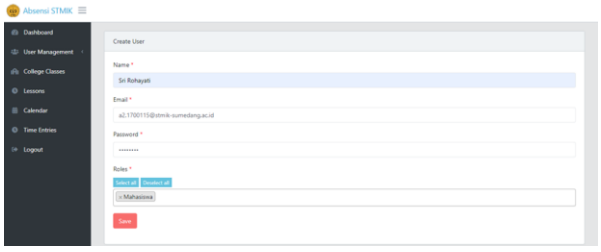

Figure 3. register user

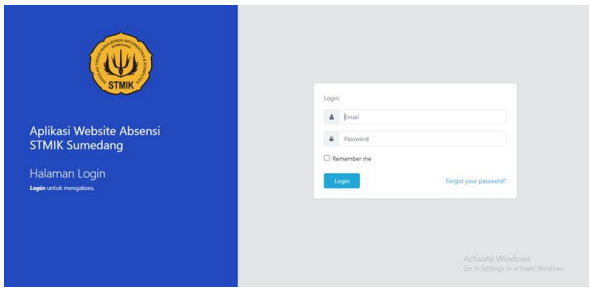

Figure 4. login Form

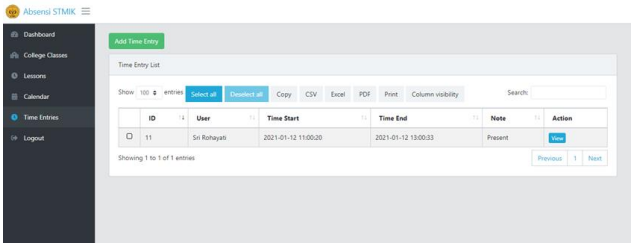

Figure 5. Lecturer Attendance

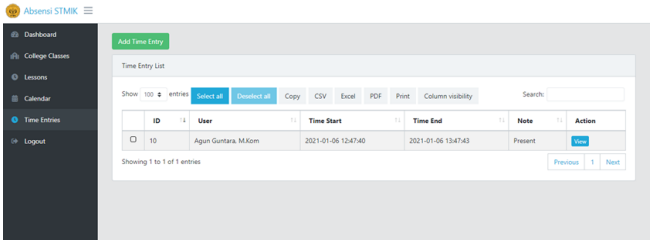

Figure 6. Student Attendance

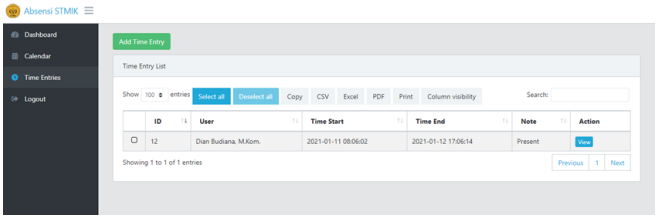

Figure 7. employee Attendance

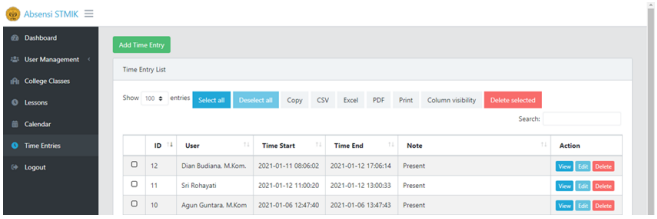

Figure 8. Admin Form

IV. Conclution

By designing a Web-based application that is able to record attendance data more easily with attendance intermediary devices with microcontroller-based IoT. The method used is the waterfall, the steps taken include the method of collecting data on an ongoing system, identification and analysis of system and user requirements, system design based on studies, designed with the PHP programming language and MySQL database with the addition of Laravel Framework and Vue.js as application formation. The proposed. The Internet of Things (IoT) microcontroller is used as a reader and sender of data for

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REFERENCES

[1] T. Journal and E. Februari, "Perancangan Sistem Absensi Online Menggunakan Android Guna Mempercepat Proses Kehadiran Karyawan Pada PT. Sintech Berkah Abadi," Peranc. Sist. Absensi Online Menggunakan Android, vol. 1, 2017

[2] M. I. Hanafri and I. Luthfiudin, "Rancang Bangun Sistem Monitoring Kehadiran Dosen Berbasis Web Pada STMIK Bina Sarana Global," vol. 8, no. 1, 2018

[3] W. Yuliyanti, "Perencanaan Dan Pembuatan Aplikasi Absensi Dosen Menggunakan Radio Frequency Identification (RFID) (Studi Kasus Politeknik Negeri Tanah Laut)," 2016.

[4] Muhammad Agreindra Helmiawan. (2017). Pengelolaan Administrasi Umum, Aset Dan Kepegawaian Berbasis Web di Pemerintahan Kabupaten Sumedang. Infoman's : Jurnal Ilmu- Ilmu Manajemen Dan Informatika, 11(2), 109-118. https://doi.org/10.33481/infomans.v11i2.32

[5] A. P. Basuki, "Konsep dan Implementasi Pemrograman LARAVEL," in CV Lokomedia, 2019.

[6] L. Gani and C. V Lokomedia, "Menguasai Vue.js," in CV Lokomedia, 2018

[7] A. Jadid, Z. Zulhelmi, and A. Ardiansyah, "Rancang Bangun Sistem Absensi Perkuliahan Auto ID Berbasis RFID yang Terintegrasi dengan Database Berbasis WEB," J. Karya Ilm. Tek. Elektro, vol. 2, no. 2, 2017.

[8] A. Y. Ananta, N. Noprianto, and V. N. Wijayaningrum, "DESAIN SISTEM SMART ATTENDANCE MENGGUNAKAN KOMBINASI SMART CARD DAN SIDIK JARI," Sist. J. Sist. Inf., vol. 9, no. 3, pp. 480–492, 2020.

[9] L. A. P. N. Malang and A. Rizaldi, "SISTEM PRESENSI MENGGUNAKAN NFC SMARTPHONE ANDROID DAN RASPBERRY PI (STUDI KASUS POLITEKNIK NEGERI MALANG)," 2020.

[10] I. Noprianto, "PERANCANGAN SISTEM PENDUKUNG KEGIATAN MAHASISWA BERBASIS KARTU TANDA MAHASISWA ELEKTRONIK (E-KTM) MENGGUNAKAN RADIO FREQUENCY IDENTIFICATION (RFID)(Studi Kasus: Teknik Informatika Universitas Pasundan)." Fakultas Teknik Unpas, 2018.

[11] S. L. Rosa and E. A. Kadir, "Absensi Online Untuk Ruang Kelas Berbasis Cloud Computing," IT J. Res. Dev., vol. 4, no. 1, pp. 19–27, 2019.

[12] I. Noprianto, "PERANCANGAN SISTEM PENDUKUNG KEGIATAN MAHASISWA BERBASIS KARTU TANDA MAHASISWA ELEKTRONIK (E-KTM) MENGGUNAKAN RADIO FREQUENCY IDENTIFICATION (RFID)(Studi Kasus: Teknik Informatika Universitas Pasundan)." Fakultas Teknik Unpas, 2018.

[13] D. N. Sari, "RANCANG BANGUN APLIKASI SMART PRESENSI PERUSAHAAN MENGGUNAKAN LOCATION BASED SERVICE (LBS) DAN QR CODE SCANNING." Universitas Islam Negeri Sultan Syarif Kasim Riau, 2019.