Student attendance monitoring system using fingerprint and WhatsApp

by Mochamad Fajar Wicaksono

STUDENT ATTENDANCE MONITORING SYSTEM USING FINGERPRINT AND WHATSAPP

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Abstract

This study aims at creating a student attendance monitoring system using fingerprint and WhatsApp. It is due to the tight activity of parents or guardians which make them difficult to monitor their children's attendance at school. The system approach and development method used were object oriented and waterfall. The waterfall method consists of requirements, design, and implementation. The study results present that the system can send messages about students' attendance via WhatsApp. The system can help the teacher in managing student attendance data as well as informing parents or guardians of students about the date and time when students enter and leave the school. Other than that, it can also help in informing students' presence on that day so that parents or guardians know that the student is attending school. The system also provides summary of student attendance data in one semester via WhatsApp number of parents or guardians.

Keywords: Attendance, Fingerprints, Monitoring system, School, WhatsApp.

1. Introduction

Fingerprint authentication is one of popular authentication systems because it is unique and long lasting [1]. It is a method for user authentication based on the fingerprint which is a legally and reliably accepted biometric authentication [2]. Fingerprint authentication is widely used in employee and student attendance systems. The fingerprint attendance system is secure because it cannot be imitated and transferred easily to others [3]. A good attendance system is not only maximized both teacher and student performance but also saves their time [4, 5]. Implementing an attendance system reduces paper waste and ease the workload of teachers. Besides, using the fingerprint for attendance system is reasonable and cost-effective [5, 6]. Currently, most attendance system is done by recording the list of students who are present into the attendance sheet [7, 8]. With the current attendance system, parents or guardians do not get information about student attendance data unless they requested it to the teacher. Meanwhile, increasingly dense activity makes it difficult for parents or guardians to monitor students' attendance at school.

A study entitled Fingerprint Based Student Attendance System using Global System for Mobile Communications (GSM), produced a fingerprint-based attendance system that send a message to parents or guardians about the status of student attendance on that day. It helps them in monitoring student attendance at school. Messages was sent to parents or guardians by utilizing Short Message Service (SMS) technology [9]. In line with previous research, research at Philippines in 2014 produced a student attendance monitoring system using fingerprints for the login and logout of pupils [9]. The monitoring system send a message to parent about pupils' attendance via SMS [10]. Ezeofor [11] briefly proposed a student attendance monitoring system based on Internet of Things (IoT). This attendance monitoring system is used to support student performance, make it easier to manage the data received, and facilitate the determination of student relationships with the required requirements. In addition, the existence of monitoring system can help in shaping the character of students. Olagunju et al. [12] proposed a proper fingerprint-based system to monitor the staff attendance. The developed system was proposed to make sure that the staff members are punctual and do their jobs on time by ordering the staff to sign in and sign out their attendance. It also creates the report so that the administrator can easily analyze the staff performance.

Unfortunately, based on comparison of fingerprint-based attendance system conducted by Hitesh Walia and Neelu Jain, using GSM technology requires high costs [13]. People nowadays are switching to use a free messaging platform such as WhatsApp, so that they can send messages for free [14]. WhatsApp can be used on Android and iPhone smartphone as well as Mac and Windows PC. Many people use WhatsApp because it is convenient, user friendly, and free [15]. Therefore, this research aims at creating a student attendance monitoring system using fingerprint and WhatsApp. The use of WhatsApp can reduce costs compared to using SMS on GSM technology. The designed system used an object-oriented approach and developed using the waterfall method.

2. Method

System approach and development method used object-oriented approach and a waterfall method, respectively. The waterfall method consists of requirements,
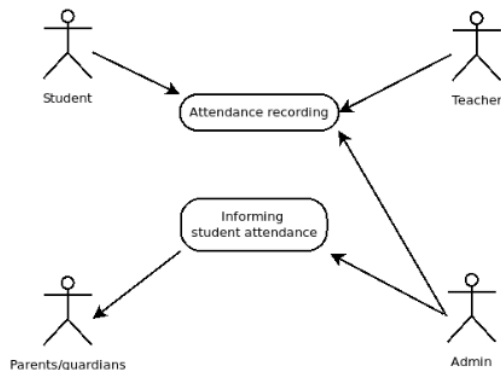
design, implementation, verification, and maintenance. In the requirements stage, data were collected related to attendance systems, such as student attendance documents, student, class, and teacher data. Then, we analyzed the current system. The trouble of the current system is parents cannot monitor their child's attendance data. The next step is the design stage, which is designing a student attendance monitoring system using a fingerprint that can send messages to parents or guardians via WhatsApp. Moreover, the tools used to design the proposed system is Unified Modeling Language (UML). After that, we implemented the proposed system into a programming language.

3. Results and Discussion

The current attendance system started with recording the list of students who are present into the attendance sheet. With the current attendance system, parents or guardians do not get information about student attendance data unless they request it. Based on previous research, which also discusses attendance-monitoring system, this research used GSM or SMS technology to inform parent/guardians about student's attendance [9, 10]. However, using GSM/SMS technology requires high costs [13].

This research goal is to create an attendance monitoring system using fingerprint and WhatsApp. Students have to log in and log out their attendance using fingerprint scanner. The system sends a message to parents or guardians regarding the time students log in and log out, the time learning activities end, the attendance of the student on that day, and the recapitulation of attendance data in one semester, which includes the number of attendances, absences, and permits.

Actors who interact with the system are students, parents or guardians, admin, and teacher. The case contained in the attendance monitoring system is recording attendance and informing attendance data to parents or guardians. In the proposed attendance monitoring system, the teacher has the access to see and update student attendance data. This system assists teacher in managing student attendance data. Moreover, admin has the access to manage data master, student attendance data, and manage the time of notification delivery to parents or guardians. In addition, parents or guardians then receive the notification through WhatsApp as shown in Fig. 1.

Fig. 1. Use case of attendance monitoring system

Figure 2 shows how students' attendance is recorded by logging in and logging out through fingerprint scanner. Fingerprint scanner saves the data into the database with configuration. Then, the attendance data is sent to parents or guardians' WhatsApp through internet network.
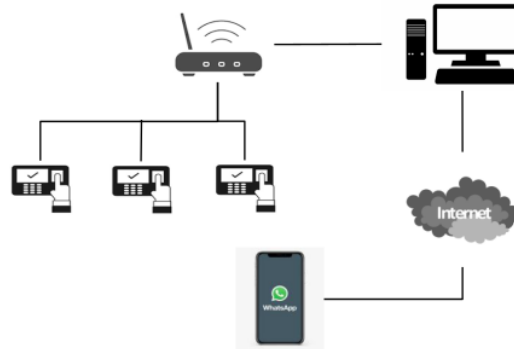

Fig. 2. Flow of Attendance-monitoring system

If the student did not log in through the fingerprint system until the learning hours start, the system will automatically note that the student was absent on that day. The absence of students on that day will also be informed to parents or guardians. Information about student attendance such as the time students log in and log out and the attendance of the student on that day will be sent to parent/guardians at 8.00 AM. In addition, information about learning activities will inform parents or guardians 45 minutes before the learning activities end. The recapitulation of attendance data in one semester, which includes the number of attendances, absences, and permits, will be sent at the end of the semester. All information is sent to the student's parent or guardians' WhatsApp number. This system also gives the teacher access to update student attendance data. This is done if students, who were absent, present with a permit.

Before using the system, admin and teacher should login first as shown in Fig. 3. Admin can be anyone who is in charge of managing student attendance data. To login, both admin and teacher must fill in the username and password.

If the login is successful admin can manage class data, student data, teacher data, student list, and attendance data as shown in Fig. 4. Admin can insert new data, edit, and delete the class, student, and teacher data. They can also edit attendance status of student.

In addition, teacher privileges are viewing and editing student attendance data where they are the homeroom teacher as seen in Fig. 5. Teacher also can print the attendance data and student list. Attendance data consists of attendance ID, fingerprint ID, date of attendance, student ID, student name, check in and check out time, as well as status of attendance. The limit for recording attendance data using fingerprint is 8 AM or based or according to the time settings made by admin. If the student did not attend to the school until 8.00 AM, their attendance status changed to alpha by default and the check in and check out time is at 8.00 AM.
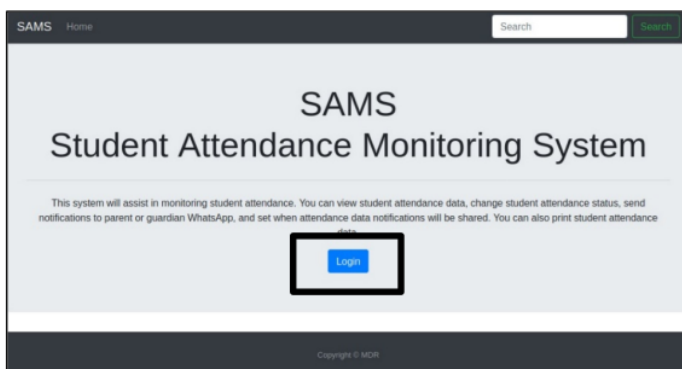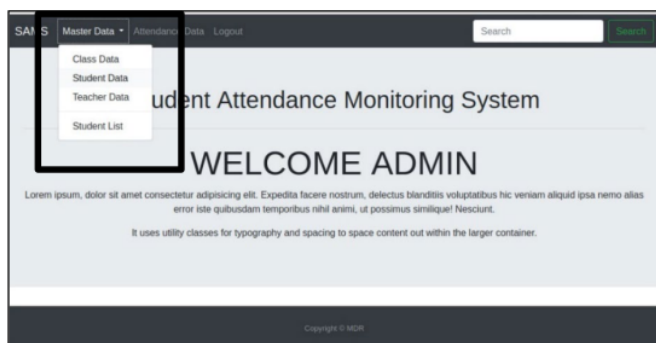
Fig. 3. Login

Fig. 4. Admin privileges

Fig. 5. Attendance data

When next day the student come to school with a permit as proof of his absence, the teacher can change the attendance status as seen in Fig. 6. Other data besides attendance status cannot be changed by the teacher. The types of status provide included present, alpha, permission, and ill.

Fig. 6. Editing attendance status

Another feature provided in this system is that the admin can set the time notifications regarding student attendance status, check out hours, hours of study activities ended, and a recap of student attendance in a semester will be sent to parents or guardians WhatsApp.

This study is different from previous study that requires high costs due to the use of GSM technology [13]. It is because using WhatsApp can reduce costs compared to use SMS on GSM technology. In addition, this research also produces more detailed information about student attendance.

4. Conclusion

Student attendance monitoring system has been completed and can help teacher in managing student attendance data. Besides, this system makes admin can inform parents or guardians about student attendance. In addition, it also helps parents or guardians in getting the information through WhatsApp. Therefore, they can monitor their children easily with this system. For further development, parents or guardians can have access to the system to manage the notification they want to receive such as check in and checkout time, attendance status, time for leaving school or summary of student attendance data in one semester.

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