Volume 1 Nomor 2

P-ISSN : 2620-8342
e-ISSN : 2621-3052

JNKTI

Jurnal Nasional Komputasi dan Teknologi Informasi

Diterbitkan Oleh
Program Studi Teknik Informatika
Universitas Serambi Mekkah Banda Aceh

SUSUNAN DEWAN REDAKSI

“JURNAL NASIONAL KOMPUTASI DAN TEKNOLOGI INFORMASI (JNKTI)”

Penerbit

Program Studi Teknik Informatika

Universitas Serambi Mekkah

Alamat Penerbit

Gedung H Fakultas Teknik Universitas Serambi Mekkah

Jl. T. Imum Lueng Bata , Telp. (0651)26160 Batoh – Banda Aceh

SINOPSIS

Jurnal Nasional Komputasi dan Teknologi Informasi (JNKTI) merupakan jurnal ilmiah nasional yang diterbitkan oleh Program Studi Teknik Informatika Universitas Serambi Mekkah yang mempublikasikan artikel-artikel ilmiah dalam bidang komputasi dan teknologi informasi.Jurnal ini terbit sebanyak 2 (dua) kali dalam 1 (satu) tahun yaitu pada Bulan Maret dan Oktober. Bidang-bidang fokus penelitian yang akan dipublikasi dalam jurnal ini antara lain :

- Bidang Rekayasa Perangkat Lunak
- Bidang Jaringan Komputer
- Bidang Multimedia dan Pengolahan Citra Digital
- Bidang Komputasi
- Multidisiplin ilmu lainnya yang relevan

DAFTAR ISI
JNKTI VOL.1 NO.2, OKTOBER 2018

Jurnal Nasional Komputasi dan Teknologi Informasi
Vol. 1 No. 2, Oktober 2018
P-ISSN 2620-8342
E-ISSN 2621-3052

Application of SMS Gateway on Attendance Detection Systems using RFID

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Abstrak. *The student attendance monitoring system at school is currently only carried out by the teacher in the form of a student attendance system that is carried out at the beginning of each lesson. And for parents students only get student attendance reports from the final school report. In this case, parental monitoring of student attendance at school on a daily basis cannot be obtained. So it is therefore necessary to have a student attendance detection system that can be monitored remotely. For this reason, the article aims to build a student attendance detection system using RFID that implements sending attendance information to students using SMS to parents of students. The system is built using RFID Tags, RC522 RFID Readers, Arduino Uno and GSM SIM900 modems. The results of the analysis and design of the system, the student attendance detection system has been able to detect the presence of students through RFID tags that are used as student attendance and send attendance information via SMS to parents of students.*

Keywords: Monitoring, Attendance, RFID, SMS Gateway, Microcontroller systems.

1. Introduction

Student attendance system in a school activity is one of the important objects that must be considered. This is because the data collection of a person's presence in a teaching and learning activity is an assessment for the teacher which shows that a student has followed a lesson.

In the current development of the daily attendance system carried out by schools is one of the assessment data for teachers. While for parents, students will receive attendance reports at the end of the semester. Reporting on student attendance at the end of the semester is one of the weaknesses of the teacher's attendance recording system at this time. To avoid bad student attendance information at the end of the semester, a system for detecting student attendance in class is needed that can be monitored daily for parents in real-time. This is necessary to avoid ongoing student absence information.

Seeing the interests of parents in monitoring student attendance remotely, this paper aims to build a student attendance information system by implementing SMS gateway technology in providing information to

parents through SMS information. In addition, this paper aims to utilize RFID technology as a student identity card in detecting the presence of students in schools and Arduno Microcontrollers as processing data on attendance of students.

Based on the purpose of this paper, the system prototype is expected to help parents and teachers in monitoring student attendance remotely everyday to anticipate ongoing student absence.

2. Literature Review

The development of information technology has had a major impact on the development of information systems. Information system is an integration between Hardware and Software that is used to convert data into information [1]. The information generated can be in the form of data reports and public information that can be accessed through web technology [2]. Due to the development of information systems currently developing not only in the corporate information system sector, but also in the information system of disaster, security and education administration systems.

In the education administration system there are several activities that have used computer technology such as making reports is the system of student attendance. Student attendance information system is one of information technology that provides convenience to the teacher in registering student attendance [3]. In some places a student attendance information system has been developed and has been applied to the Muhyiddin Islamic Boarding School in Surabaya in the form of a web-based interface [3] and its application to attendance data collection in banjar activities in Bali [4]. The attendance information system that has been implemented has been able to provide information in real time. Real-time information systems are systems that can provide decisions or process data directly into information [5].

In several absences information system development that has been done, it still uses a web interface based login system. At present there has been an development of an identity system built using radio frequency technology that is able to provide a difference in the ID or identity of each user, namely RFID (Radio Frequency Identification)[6]. In its application to the student attendance information system, it has been carried out by Murizah Kassim, namely the integration of the student attendance information system with RFID [7].

From information system research that has been developed, information is only centered on the interests of the teacher to find out the list of students who attend the lesson and are rarely touched for the benefit of parents of students in monitoring student attendance remotely. Therefore, there is the role of one of the GSM technologies, namely the SMS Gateway, which can provide media with attendance information for students remotely using SMS services. It is evident that GSM technology-based information system integration has been able to provide real-time

information to users. This can be seen from GSM-based applications that have been developed such as flood monitoring information systems that send flood location data directly through GSM communication media [8] and GSM-based fire information system [9][10]. As well as applications on information systems for inventory of consumables on offices based on the SMS gateway [11].

In the integration between RFID and GSM in the form of a portable attendance information system, a microcontroller is needed as a data processor. The microcontroller is a data processing media that is devoted to running mono-tasking so that the data processing system is faster [12][13].

3. Methods

The research method that was built in making the information system for monitoring student attendance based on SMS Gateway is divided into two stages, namely system analysis which functions to explain the description of the overall system usage. While the system design stages function to explain in detail the circuit used in the system in the form of block diagrams.

3.1 System Analysis

Based on the purpose of making a monitoring information system students use GSM communication systems in the form of SMS gateways, the description of system analysis as seen in Figure 1 can be explained that the use of the system begins with students doing attendance using card-shaped RFID tags. The card is brought to the RFID reader. Data read by RFID readers is forwarded to the presence detection system for processing. Attendance data that has been processed will produce data on the student's telephone number and text text. Text data is sent via a modem in the form of an SMS service intended for parents' mobile phones.

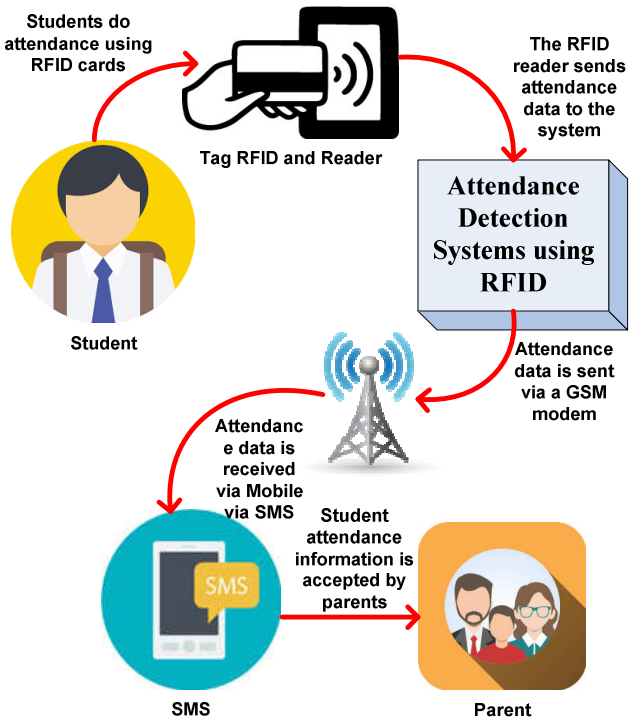

Figure 1. System Analysis

3.2 System Design

The second stage of making a system is system design. In system design there are two sub-stages, namely the design of system block diagrams and system flowcharts. The system block diagram as seen in Figure 2 can be explained that the system consists of three modules including the RFID reader RC522 as the input block, the Arduino Uno microcontroller as the processing block and the last is the SIM900 type GSM transmitter module as the output block. The connector between the RFID reader and the Arduino Microcontroller is connected in detail GND from the Arduino Uno Microcontroller connected to the negative (-) RFID pin and the 3.3V Pin from the Arduino Uno Microcontroller connected to the VCC pin of the RFID Module. Whereas the data port connector is Pin 8-10-11-12-13 from the Microcontroller connected to the RST-SDA-MOSI-MISO-SCK pin from the RFID Module.

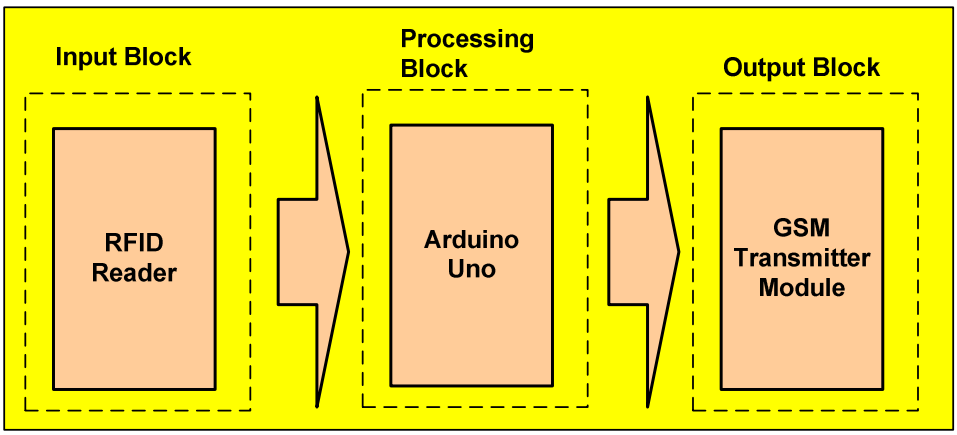

Figure 2. System Block Diagram

The next step is designing a system flowchart that is divided into two flowcharts, namely the student ID data flowchart and the telephone number. And the flowchart system sends information on student attendance via SMS. Data storage flowchart as seen in Figure 3a can be explained that the flow begins with the input of student ID_RFID data and the parent's telephone number. The data is stored on EEPROM by making verification and uploading programs to Arduino Uno via the Arduino IDE. While the flowchart sending student attendance information as shown in Figure 3b, it can be explained that the system starts with loading student ID_RFID data and telephone number from EEPROM to Microcontroller memory. Furthermore, the system waits for ID tag data from student RFID cards, if ID_TAG is the same as ID_RFID students then retrieve telephone number data based on student ID_RFID and SMS text set for student attendance information. The SMS text that has been set is sent via a GSM modem.

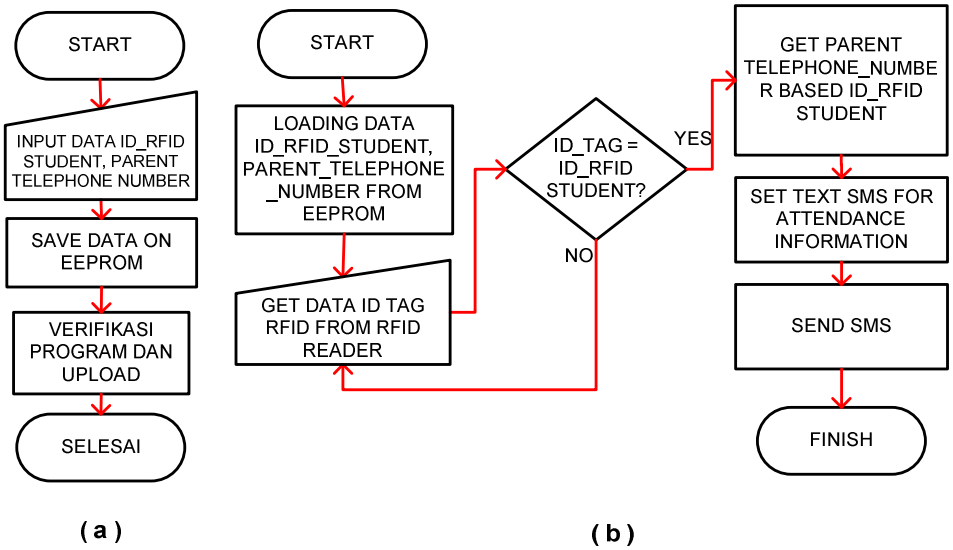

Figure 3. Flowchart system

4. Result

Based on the results of system analysis and system design, the making of a student attendance monitoring information system based on SMS Gateway has been built using RFID Reader as an RFID Tag detector, Arduino Uno Microcontroller as a data processor and GSM modem module as the sender of student attendance information via SMS .

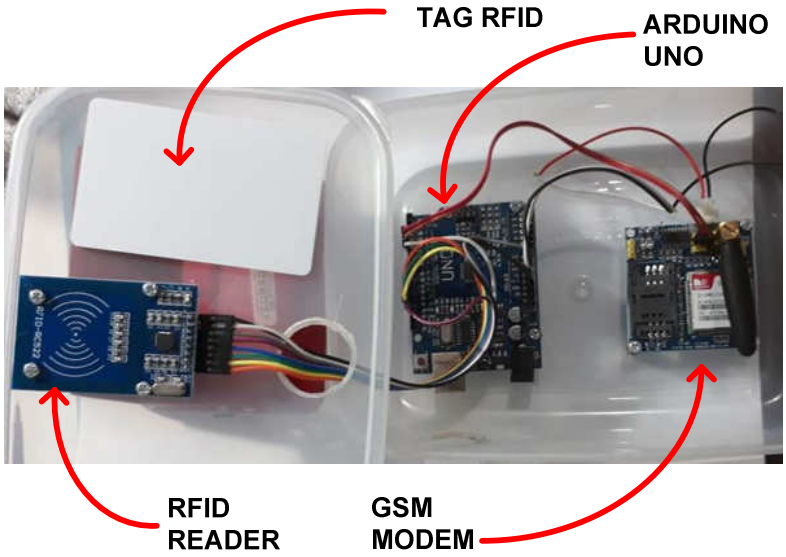

Figure 4. System Prototype Results

Before the student attendance information system prototype was used, it was necessary to store the ID_RFID data of students, student names and telephone numbers according to the table as seen in Table 1. The storage system was carried out following flowchart 3a.

Table 4.1 Student Data stored in the Microcontroller's memory

No	Student ID_RFID	Student Name	Telephone Number
1	410069E7A36C	Andika	08136043xxxx
2	41006A024F66	Salman	08526065xxxx
3	410069D3E61D	Torik	08136077xxxx
4	410069D3E62A	Salwa	08536006xxxx

Based on the results of the system test following the flowchart in Figure 3b, the RFID student tag data detected by the RFID reader will be processed by detecting whether the ID is the same as the student ID_RFID stored on the EEPROM. If it is not the same, the system will not send attendance information, and if so, the microcontroller sends student

attendance data via SMS via a GSM modem. The results of the SMS sent received have the editor as shown in Figure 5.

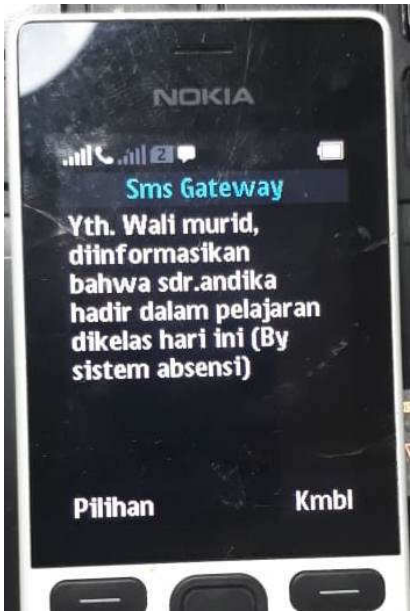

Figure 5. SMS sent by the system

5. Conclusion

Based on the analysis and design of the system of making student attendance information systems, it can be concluded that the information system for monitoring student attendance by implementing communication based on SMS Gateway has been successfully built and can be run according to the design and flowchart. Besides that the prototype has successfully detected the RFID tag as the student's identity and sent the student's attendance information via SMS. Based on the results of making the system is expected to provide benefits to parents of students in monitoring the presence of students in taking lessons remotely. Besides that, the research still has many shortcomings and it is expected that the next researcher or developer can develop a system that has been produced better and more perfectly.

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