SYSTEM ATTENDANCE BASED MICROCONTROLLER USING FINGERPRINT SENSOR in SMAN 1 CIMAHI

Arief Lukman[1], Dedeng Hirawan[2]

[1,2] Teknik Informatika - Universitas Komputer Indonesia
Jl. Dipatiukur 112-114 Bandung
E-mail : arieflukmaan@gmail.com, dedeng@email.unikom.ac.id[2]

ABSTRACT

SMAN 1 Cimahi is a public school located in JL. Cimahi Pacinan No. 22A. The school has two departments, namely the IPA and IPS which in one classroom there are 40 students, numbering each do as is done by teachers who are in every classroom by way of filling out the paper from the paper format, attendance attendance is already provided by the school. Every day the school provides 33 absentee paper according to the number of classes to meet the needs of attendance in all classes.

The solution of the problems which has been described by the building attendance system using microcontroller-based fingerprint sensor technology that aims to minimize the duplication of data on absences and errors in data pengiputan (Human Error), the school makes it easy for parents or students in attendance monitor students and teachers. A fingerprint is one of human identity that can not be replaced or changed as identifiers. Therefore, there is no human being on this earth that have the same fingerprint. In the utilization of the fingerprint technology can be used in identifying a person, even the current fingerprint is a technology that is considered quite reliable because it proved to be relatively accurate, secure and convenient for use as identification when compared to other biometric systems.

Based on the results of beta testing and black box, it can be concluded that the existence of the attendance system using fingerprint sensor technology with SMS Gateway communication media, cases of fraud in absentee charging and data manipulation that is commonly experienced by the school and the parents of the students, as well as the process of the formation of character against students originating from the discipline of time becomes more effective.

Keywords: Absence System, Fingerprint, SMS Gateway.

1. PRELIMINARY

SMAN 1 Cimahi is a public school located in JL. Cimahi Pacinan No. 22A. The school has two departments, namely the IPA and IPS which in one class there are students numbered 40, each doing a course conducted by the teacher is in every classroom by way of filling out the paper from the paper format, attendance attendance is already provided by the school. Every day the school provides 33 absentee paper according to the number of classes to meet the needs of attendance in all classes.

A fingerprint is one of human identity that can not be replaced or changed as identifiers. Therefore, there is no human being on this earth that have the same fingerprint. In the utilization of the fingerprint technology can be used in identifying a person, even the current fingerprint is a technology that is considered quite reliable because it proved to be relatively accurate, secure and convenient for use as identification when compared to other biometric systems. This is due to some of the properties of a fingerprint that is among others: decent (feasible), different from each other (distinct), fixed (penent), accurate (accurate), reliable (reliable) and unacceptable (acceptable).

Based on the results of the first interview with Mr. Sukarsa as vice principal part publicist, he concluded that the process of attendance are still carried out manually by filling out on paper as provided by the school. Therefore, many of the problems that happen to arise include day care attendance, falsification of licence or sick by the students of the unknown by parents, and the presence of some of the students did not enter the final due on subjects already left school or go home prematurely.

Results from the second interview conducted with the Mother goddess as vice principal parts of the curriculum he stated a lot of reports from students and the presence of pickets, some teachers who often come to school late causing reduced learning time students are processed, as well as several teachers who go home prematurely without the knowledge of the school.

Based on the problems described then it needs a system of attendance that can provide accurate data and cannot be manipulated by students and teachers, so that the school can evaluate and monitor the presence of the entire students and teachers. So the school can tell you the presence data to parent students in schools in the form of an SMS Gateway to teacher and principal. Thus researchers will build attendance system using fingerprint sensor in

Cimahi whose SMAN 1 implementation of attendance is done when it comes and home school.

,

2. CONTENT OF RESEARCH

2.1 Basis Theory

2.1.1 Microcontroller

A microcontroller is a mini version for specialized applications of the microcomputer or computer [1]. Microcontroller is a functional computer system on a chip. It contains a processor core, memory (a small amount of RAM, program memory, or both), and input and output equipment. In other words, the microcontroller is a digital electronic device that has inputs and outputs as well as control with a program that can be written and erased in a special way. Mikrokonktroller typically used in products and equipment are controlled automatically, such as engine control systems, remote controls, office machines, household appliances, heavy equipment, and toys. By reducing the size, cost, and power consumption compared to designs using microprocessor memory and input devices separate output, microcontroller presence make electrical controls for different process more economical.

2.1.2 Fingerprint Sensor

It's been used a lot, started as the attendance system (System of absences/attendance), as access control (access control system into a room, place or a system) to as personal identity such as found on the DRIVER'S LICENSE (driving licence) or passport.

Although the workings of the fingerprint system is very complicated and it also has a long process, but in only 3 minutes you can find out if your fingerprint is suitable or not in the database.



Figure 1. Fingerprint Sensor

2.1.3 Module SIM900A

SMS Gateway is a platform that provides a mechanism to send and receive SMS (short message service). SMS Gateway can communicate with another device that has the SMS platform for sending and receiving SMS messages with very easy. This is possible because SMS Gateway also provided an easy interface and standard.



Figure 2. Module SIM900A

2.1.4 Arduino Uno

Arduino Uno is used as the device that connects all types of electronic components or IOT. On this research such as sim900a and fingerprint module.



Figure 3. Arduino Uno

Table 1. Commands AT Command

Microcontroller	Uno R3
Operating Voltage	5V
Input Voltage (recomended)	7-12V
Input Voltage (limit)	6-20
Pin Digital I/O	54 (the 15 pin used as PWM output)
Pins Input Analog	16
Arus DC pin I/O	20 mA

2.1.5 Website

The website is a facility that is most frequently used and accessible to everyone on the Internet. Web has grown so rapidly these days. Many web that have sprung up on the internet. The web development to attract everyone to learn how to make it. A simple and informative web can be built using HTML, CSS, and JavaScript. Web programming is divided into 2 of the Server Side and Client Side [2].

2.2 Analysis and Design

2.2.1 Analysis System

System analysis can be defined as a description of a whole information system into parts of its components with a view to identifying and evaluating problems, obstacles that occur and the expected needs so as to proposed perbaikan-perbaikannya.

The analysis done by doing the interview against the parts associated with the system will be built, that is, the head of the school, a part of the curriculum, the student section, the students and parents of the school of public relations.

2.2.2 Analysis Problem

From the results of observation of the system that is running on a 1 there are several Cimahi SMAN problem as follows:

1. The school has not had a system to monitor the students, resulting in parents can not know whether the students came to school or not.
2. The principal can not monitor the teachers came to school late, due to the existence of the system has not been able to monitor teacher who comes too late.

2.2.3 Analysis Of The Running System

Analysis of system running is the decomposition of absences that there has been or is being bejalan with the aim to evaluate, formulate the goals you want to accomplish with the new system, as well as drawing up the development plan system.

Based on the results of the obsevasi that have been conducted and interviews with relevant parties obtained the running procedure is as follows:

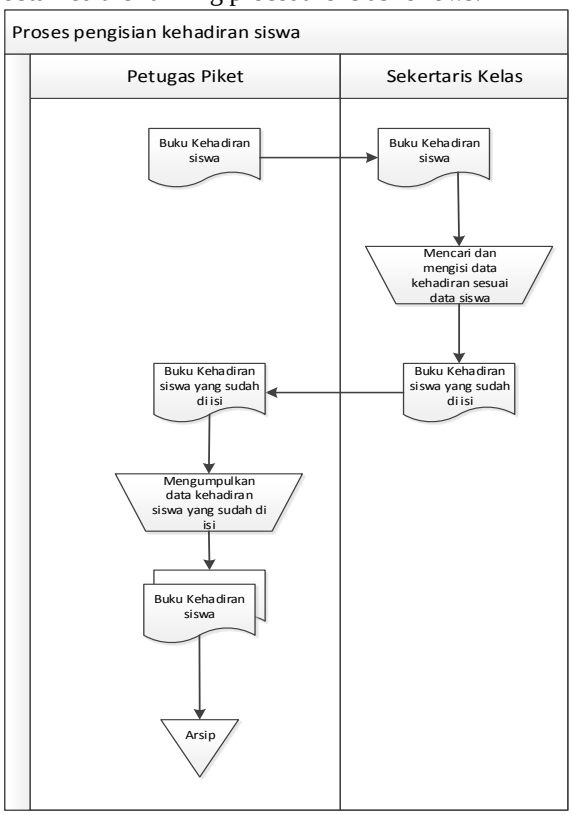


Figure 4. Process of Charghing the Presence

2.2.4 Analysis Of The System Will be Built

In this analysis will be given step-by-step how the system will be designed, to clarify the description of the design of the system architecture then can be seen below

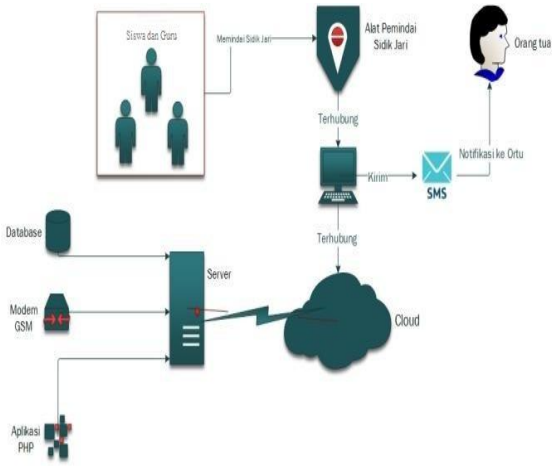


Figure 5. System Will be Built

1. FINGERPRINT
   a. Fingerprint functions as a tool for detecting fingerprints students and teachers
   b. students and teachers can't do attendance using someone else's fingerprints
   c. in the event one of the problematic or fingerprints cannot be used, students and teachers are expected to soon do a new fingerprint scanning
2. Charging attendance
   a. the officer on duty or system admin login to attendance system
   b. Students – students do charging presence through fingerprint
   c. the system will display the scanned fingerprints the students in accordance with the identity of the students
   d. after the data match between fingerprint and identity data, further absences students will be sent to the parent of each students
3. Charging the presence of teachers
   a. the officer on duty or system admin login to attendance system
   b. Teachers do charging presence through fingerprint tools
   c. the system will display the scanned fingerprint identity in accordance with teacher teacher
   d. attendance results Data will be stored in the report

2.2.5 Analysis Hardware

Analysis of hardware requirements needed to meet the application to be run can be seen in Table 2.

Table 2. Minimum Specifications

Hardware	Specification
Operating system	Windows 7

RAM	1GB
Procesore	Core 2 Duo
disk Space	2GB

While the specifications that have been filled with users that can be seen in **Table 3.**

Table 3. Specifications owned

Hardware	Specification
Operating system	Windows 7
RAM	16GB
Procesore	Intal Core i7
disk Space	1 TB

After an evaluation of the specifications of the hardware that the hardware requirements are met

2.2.6 Analysis Software Requirements

The software used in the construction of this system is as a medium to program the hardware so that the hardware can run the monitoring system in accordance with the working system to be built, it can be seen in Table 4.

Table 4. Analysis of Software Requirements

name of Entity	Attribute name
Arduino IDE	As a software which can give the arduino program.
Sublime Text	As software to make the program, the excess Sublime Text is a good user interface and pemilihian folder that is designed for programming the website.
MYSQL	As Database.

2.2.7 Use Case Diagram

Use case diagram is a diagram that shows the functionality of a system or class and how the system interacts with the outside world and explains the system is functionally a sighted user. From the identification of the actors involved in the above then Use Case Diagrams can be seen in Figure 5

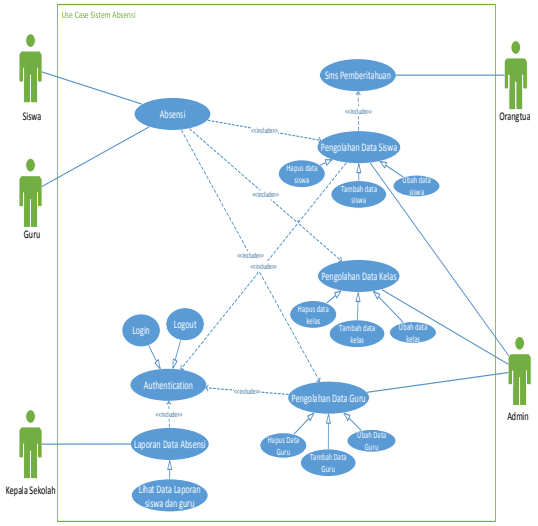


Figure 5. Use Case Diagram

2.2.8 Class Diagram

Class diagrams (Class diagram) is a structural diagram of the model a set of classes, interfaces, collaboration and their colleagues. The class diagram is shown with a box which is basically divided into three sections, namely: class name, attributes, and operations.

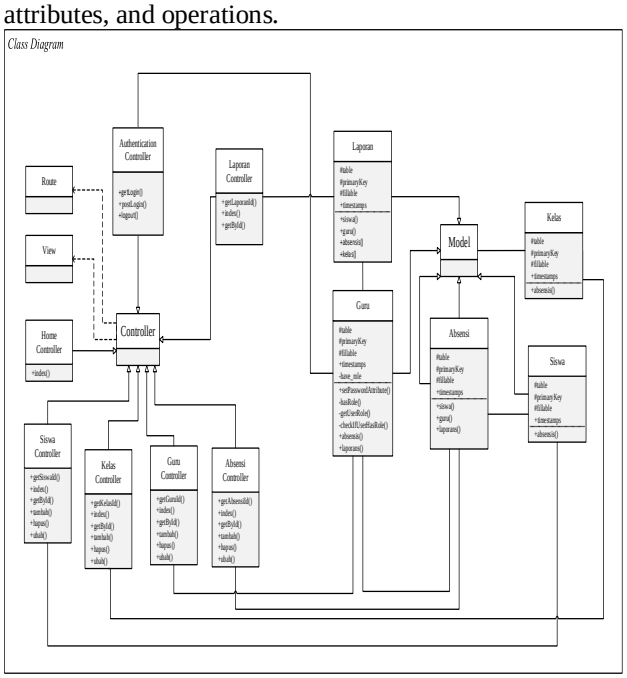


Figure 6. Class Diagram

2.3 Design

2.3.1 Interface Design

The design of the interface is a description of the interface layout system to be created. With the interface design is expected to both application developers and users can unify their views on the display layout application is made. The design of the interface is made to describe more details about the design of the display and navigation menus contained therein. Here is the interface design and navigation.

1. Design Interface Login

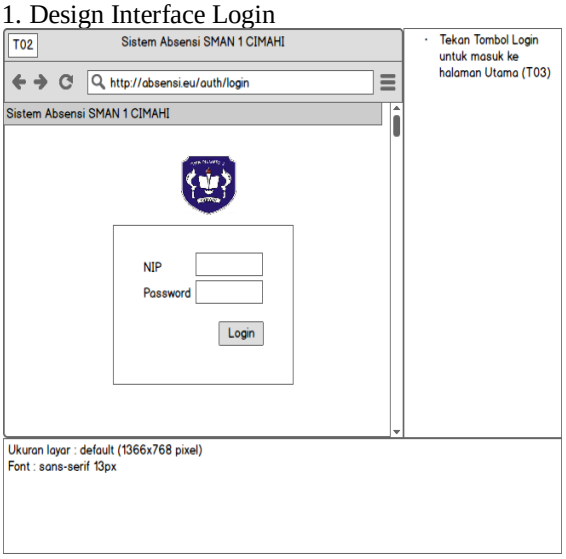


Figure 7. Interface Design Login

2. Design Interface Attendance

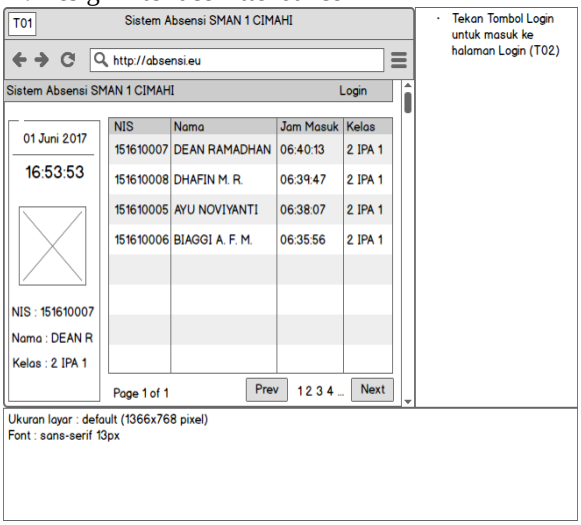


Figure 8. Interface Attendance

3. Home Page Interface Design

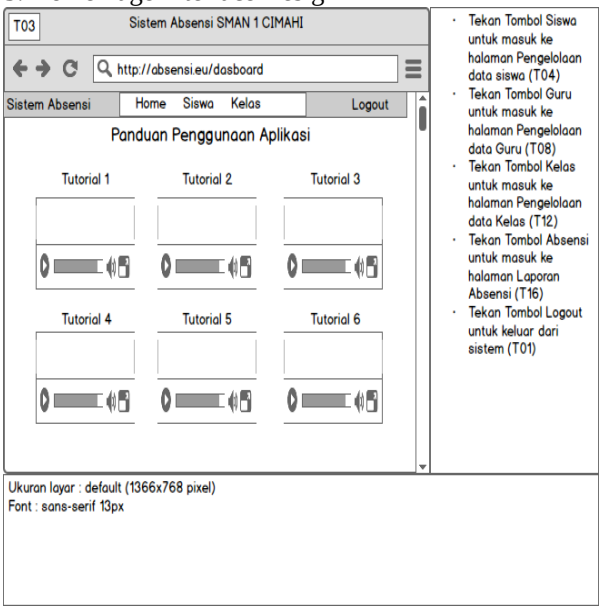


Figure 9. Home Page Interface

4. Processing Data Student Interface Design

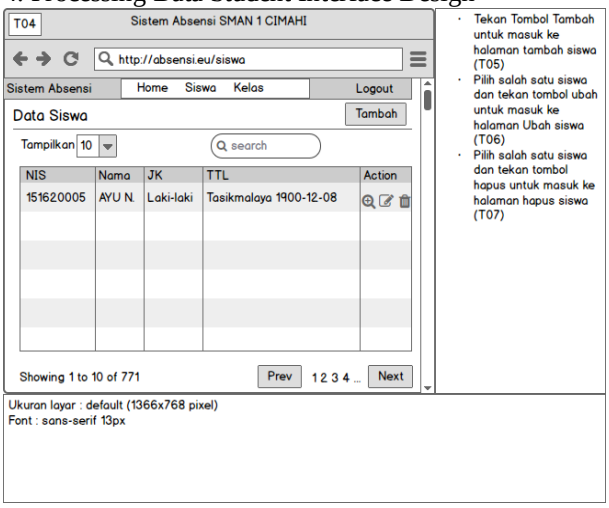


Figure 10. Interface Processing Data Student

5. Add Data Student Interface Design

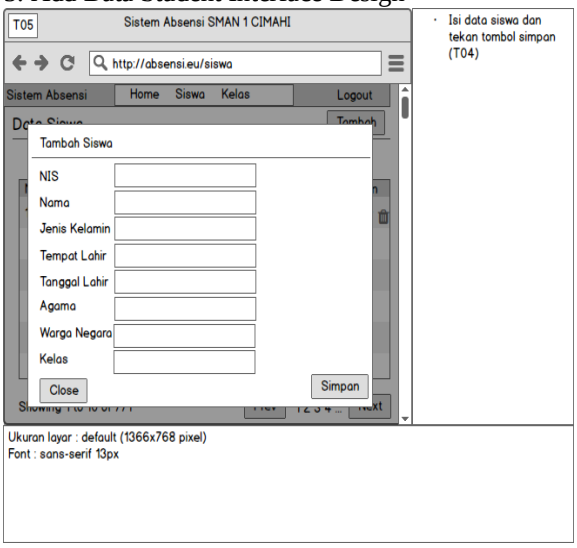


Figure 11. Add Data Student Interface

6. Edit Data Student Interface Design

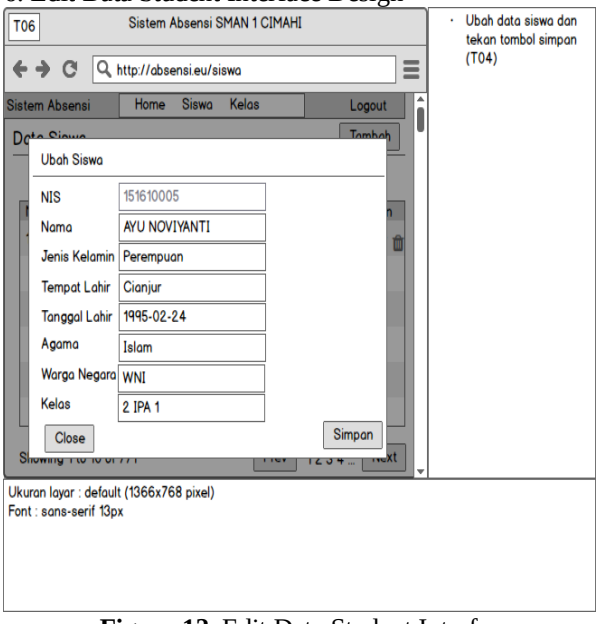


Figure 12. Edit Data Student Interface

6. Delete Data Student Interface Design

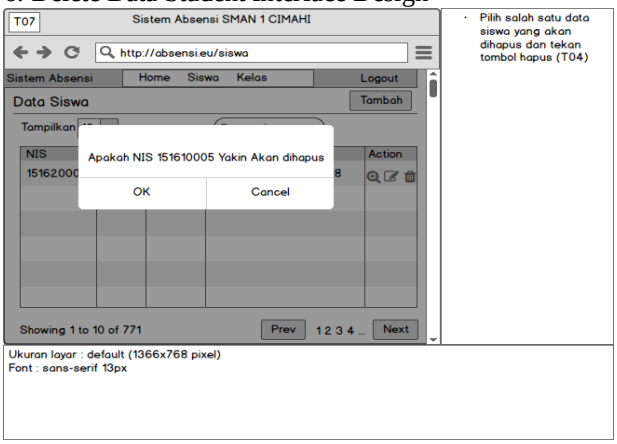


Figure 13. Delete Data Student Interface

6. View Data Attendance Interface Design

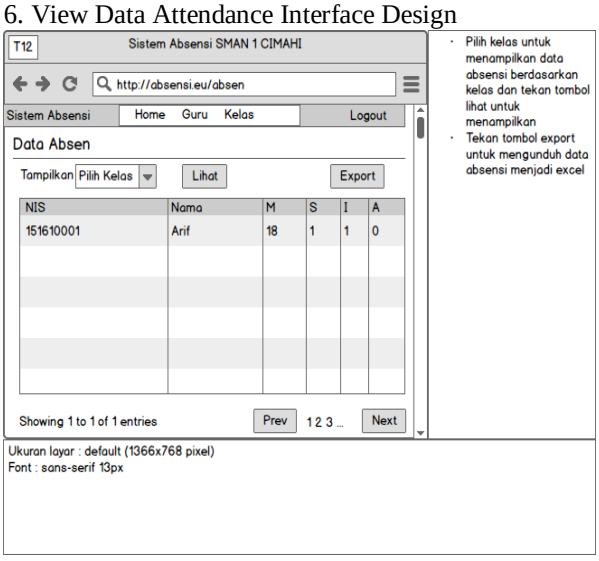


Figure 14. View Data Attendance Interface

2.3.2 Design Book

The design is done to adjust the message to the user information on the status of the success of the activities undertaken, such as the login process and deleting data. Each message should be determined the location of its appearance so that the message displayed to the user right. The details of the design of messages and their location in a particular form can be seen in Table 5.

Table 5. Designing a Message

Code Message	Message
M01	Username or Password entered is incorrect
M02	You have success login
M03	:atrribute cannot be empty
M04	:attribute already use in database
M05	Student Data was Success added
M06	Student Data was Success edit
M07	Student Data was Success delete
M08	Teacher Data was Success added
M09	Teacher Data was Success edited
M10	Teacher Data was Success delete
M11	Class Data was Success added
M12	Class Data was Success edited
M13	Class Data was Success delete
M14	Blank Report Attendance

2.3.3 Semantic Network

Semantic network is a description of the relationship navigation menu from one page to another. Semantic network on a website tirta thirst has two networks, namely the semantic network as an admin user and the user semantic network as an employee. The following semantic networks can be seen in the picture 15.

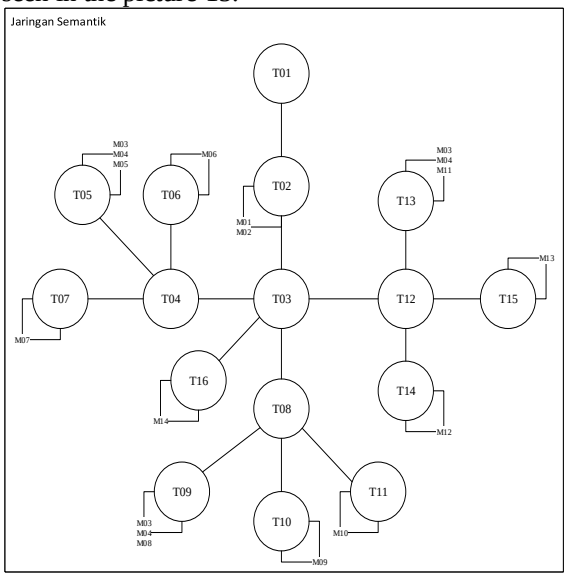


Figure 15. Semantic Network Admin

2.3.4 Design Hardware

In this section are described some of the hardware IE: block diagram is a basic overview of the system to be designed. Each section of the block diagram has a function, respectively, by understanding the picture diagram block diagram then the system to be designed can already be recognized properly. As for the picture of the block diagram of the system to be designed is as follows.

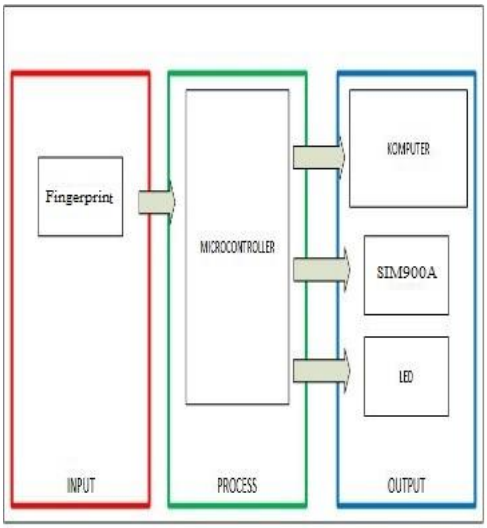


Figure 16. Block Diagram

2.4 Implementation and Testing

2.4.1 Hardware Implementation

Hardware specifications on the hardware used microcontroller in Table 6.

Table 6. Hardware Implementation

Hardware	Specifications
Processor	Intel Core i3
Monitor	14 inchies (1280 x 768 pixel)
RAM	2 GB
Hardisk	320 GB
Graphics	Intel(R) HD Graphics
Microcontroller	Arduino Uno 3
Modul Fingerprint	Fingerprint module ZFM60
Modul GSM	SIM900A

2.4.2 Software Implementasi

The specifications of the software used for the development of application system of attendance using the sensor sidikjari/Fingerprint on SMAN 1 Cimahi is as follows

Table 7. Software Implementasi

Software	Admin
Operating System	Windows 7
Web Server	Xampp v3.2.2
Language Program	PHP
Browser	Mozila Firefox

2.4.3 Testing Fingerprint

The most important part is the fingerprint for membacara data from fingerprints, and testing is done to see if it can detect any Fingerprint fingerprints when affixed to Fingerprint or not.

Table 8. Fingerprint Testing

Experiment	Long Read (seconds)	Readable
Experiment 1	2	Yes
Experiment 2	3	Yes
Experiment 3	7	Yes
Experiment 4	11	No
Experiment 5	15	No

From table 8 is a long trial read Fingerprint against the fingerprint. After doing 5 times maximum long experiment obtained results read the Fingerprint against the fingerprint with the old maximum of 3 seconds.

2.4.4 Testing Maximum Degree of Slope

The most important part is the fingerprint for membacara data from fingerprints, and testing is done to see if it can detect any Fingerprint fingerprints when affixed to Fingerprint or not.

Table 9. Slope Of the Testing

Experiment	Degree of Slope	Readable
Experiment 1	90	Yes
Experiment 2	110	Yes
Experiment 3	80	Yes
Experiment 4	180	No
Experiment 5	-90	No

On testing the maximum degree of slope of the experiment read tools Fingerprint against the fingerprint. After doing 5 times maximum long experiment obtained results read the Fingerprint against the fingerprint with a slope of derajar 85 degrees.

2.4.5 Testing Buzzer

Same is the case with LED, buzzer is used as an indicator of conditions in a process. On the research of this buzzzer has 2 conditions on visits.

Table 10. Testing Buzzer

Condition	Indicator LED	Description
Success	Buzzer on for 700ms	Light up
Errors	Buzzer light up blinking for 3 times	Light up

2.4.5 Testing LED

The function of the LEDS used are used as an indicator of the condition or stages in a process. On this instrument have LED 4 conditions, which can be seen

Table 11. Testing LED

Condition	Indicator LED	Description
Standby	LED a glowing blue light flashes	Light up
Scan	LED colors blue, green and red LED flashes alternately	Light up
Success	LED green color on for 700ms	Light up
Errors	LED red flashes 5 times	Light up

2.4.5 Testing Module GSM

The function of this module is used to find out the long text message delivery against a number of objectives with the status sent or not.

Table 12. Testing Send SMS

Experiment	Long Send (second)	Send
Experiment 1	5	Yes
Experiment 2	7	Yes
Experiment 3	10	Yes
Experiment 4	15	No
Experiment 5	20	No

On testing can be seen that the delay in sending an sms that is revolved around 15 to 20 seconds. And the message will be automatically failed.

3. CONCLUSIONS

3.1 Conclusions

After a stage of analysis, design, implementation and testing so it can be retrieved the following conclusions:

1. all activities of absentee students and teachers can already managed by admin/clerk using a system built by operating system this course there will be no deception or negligence from the part of the picket and help improve discipline students and teachers to attend school on time, there will be no more cheating either students or teachers who will not go to school.
2. attendance System Application this can help parents find out her son's absences for school staff in all schools and authorities know teachers who avidly or not avidly attend school.

3.2 advice

Suggestions for the development of application system of the course in order to be further improved or focused again on his attendance and academic system, i.e. a website so that the information obtained can be useful for parents and the school.

BIBILIOGRAFI

[1] Eko, Agfianto Putra, 2003, Belajar Mikrokontroler AT89S51/52/55 (teori dan aplikasi) : Gava Media.

[2] Bertha, Sidiq. 2012, Pemrograman Web PHP Edisi Revisi, Bandung :Informatika.

[3] Presman, Roger S , 2012, Rekayasa Perangkat Lunak, Yogyakarta : Andi

[4] Rudyanto,M Arief. 2011, Pemrograman Web Dinamis Menggunakan PHP dan Mysql, Yogyakarta : Andi