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Design-Based Fingerprint Time Attendance System Using IOT With MCU Node ESP8266

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ABSTRACT

Advances in technology and the world of electronics at the moment have entered the era of modernization and development has entered a new era and has been completely automated. One of them is the attendance machine for employees. Attendance machine needed for the industry to improve the effectiveness of work. So it takes the attendance machine that can work automatically in order to simplify the system works. The purpose of this study is to design a tool that would be used for a fingerprint recognition system. The attendance system design through the process of identifying the fingerprint pattern. Fingerprints identified by C3 Fingerprint sensor will indicate that the employee is absent from work. The fingerprint pattern has previously been registered in advance and recorded is the name, Fingerprint ID, position and time of entry. Once the data has been inputted kedatabasemaka be directly recorded that the employee is coming Works. The results of testing this system has a fingerprint identification accuracy with an average of 86.67%, and the average time matching fingerprintsebesar.

1. Introduction

Attendance is a data collection activities in order to determine the amount of employee attendance on an institution [1]. One of its processes Relatives validation in Jakarta Coffee can be said to still less efficient and effective, because all is still done manually. Where still mnggunakan paper to be filled by each individual employees. In this study, Finger Print C3 is used as input components that will be processed using module NODEMCU ESP8266.

Research carried out by Salita and Handoko using microcontroller-based Fingerprint produce presenta-level testing to determine the accuracy of the system to record the fingerprint that is equal to 86.67% with scenario testing is the process of record (registration) 6 times to 10 different fingerprint [2]. Research conducted Agus, Talitha, Akhdiat, and Akhmad use NodeMCu, Sensor Peizo, and LED as an indicator for monitoring the presence of students with System Shoes Anti Bolos (si santos) is connected to the access point, then the process network traffic more congested and slow, obtained within the maximum sisantos is 30m [3] . Research conducted Yogie, Noer, Most of the educational institutions and government organizations in developing countries are still using paper-based presence to monitor attendance. There is a need to replace this with a method of recording the presence of the system safer and strong. System based automated fingerprint identification are gaining popularity because of the nature unique fingerprints [5]. Based on previous studies the application of fingerprint sensor assessed quickly and managed in the process its identification, so in this study will try to design and implement attendance system using fingerprint sensors [6] based NODEMCUESP8266 which will be connected in a database on the desktop with the nature of the user-friendly and cost not so great.

This system is calculating disuatu agency staff attendance and perform further calculations of monthly summaries kahadiran to reduce human error during calculation. Basically, this system proposed for use in curbing tardiness and truancy problems in an institution or organization. In

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this study is to make employee attendance system in a café in order to facilitate the café owner to control the presence of its employees appropriately and accurately.

2. Research Methods

2.1. System Requirements Analysis

In the system needs analysis phase aims to identify any needs in designing a system that will be created. Obtained hardware system requirements (hardware) and software (Software).

Table 1.
Hardware Specifications

hardware
1 NODEMCU ESP8266 Wifi
1 Fingerprint C3
1 Arduino Uno Atmega 328p

Table 2.
Software Specifications

Software
Xampp
PHP MyAdmin
Sublime Text
Arduino IDE v 1.8.9

a. fingerprint sensor
Biometric fingerprint system is a system that is most widely used because it has a high level of accuracy and easy to apply [7]. Siifat properties owned by fingerprints, namely:
   a) Individuality, the unique fingerprint patterns danberbeda in every person.
   b) Perennial nature, scratches on the prints will be attached to the human skin lifetime.
   c) Immutability, everyone's fingerprint patterns won't never change, unless that person get serious accident.

Fig 1. Fingerprint Sensor

b. microcontroller NodeMCUESP8266
NodeMCU is an IOT platform that is opensource. Which consists of hardware in the form of artificial System On Chip ESP8266 Espressif System, and also the firmware using external scripting programming language. NodeMCU also suitable for the project because there is wifi IOT-based embedded microcontroller ESP8266 this [8]. Specifications dair NodeMCU ESP8266 which has a size of board 57mm x 30mm, the input voltage of 3.3 ~ 5V, NodeMCU This is the second version that has a shape and black color that is different from the first version of his, using wifi module 12E and IC series uses is CP2102 version this second.

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Fig 2. Microcontroller MCU Node ESP8266

c. ArduinoUno

Arduino is an electronic platform that is open source, based on the software and hardware that is easy to use. Arduino Uno is an electronic board containing a microcontroller or a puck that is functionally acting as a computer [9]. Specifications of this tool is to use ATmega328P microcontroller with 5V voltage, its input voltage 7 ~ 12V transient voltage to limit its 6 ~ 20V, has approximately 32KB flash memory, has a 68.6mm long, 53.4mm wide and weighs 25g.

Fig 3. The Arduino Uno ATmega328P.

d. Flow chart

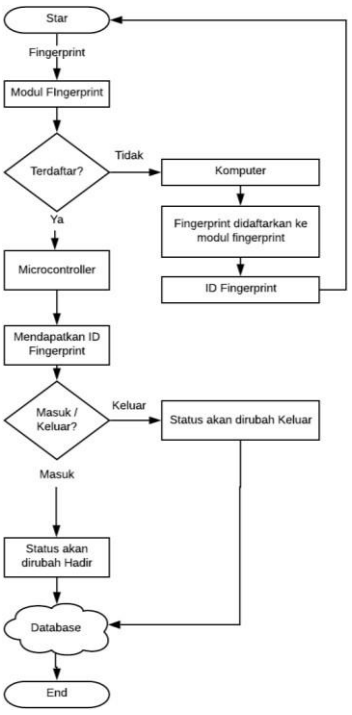

Fig 4. Flowchart System

Based on the picture above, the following is a systematic working principle of the overall tool.

1) Preparation Module FingerprintC3
2) Connect of Fingerprint Module C3 to the computer to enter data fingerprint preparation.

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3) scan fingerprint and provision of ID at fingerprint
4) The circuit previously connected to the computer, now transferred to the microcontroller circuit itself once coding padamicrocontroller.
5) Prepare the device untukscan
6) employee scans the fingerprint, then do the next process in microcontroller.
7) ID obtained will then be sent kedatabase.

3. Results and Discussion

In this study, the test results are divided into the test system fingerprint sensor hardware and database software testing application display system is created. This hardware testing include:

a. Display When Doing Record Fingerprint

In further testing, the user will perform at the registration stage Fingerprint Sensor. The registration process is performed 5 times in a row separately to make sure that our fingerprint validity of Inputed. There are 2 outputs in the testing phase is succesfull if the fingerprint is entered legible, and Failed if the fingerprint is entered illegible or detected at the fingerprint sensor. The results of testing the display can be seen in Figure 5 dan6.

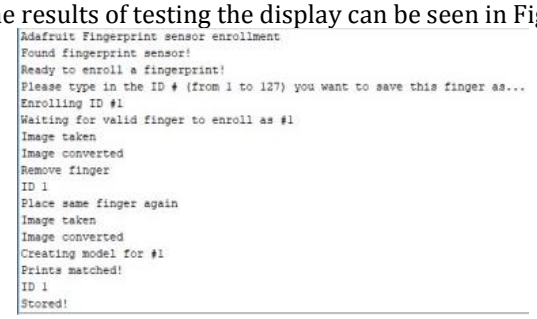

Fig 5. Record succesfull

In Figure 5, the results of fingerprint records that have registered success in fingerprint module.

Fig 6. Record Failed

In the picture above shows results failed dikarena fingerprint records that have not listed in the attached fingerprint module.

b. Display Fingerprint Reading KetikaMelakukan

The next stage, ie Users who have fingerprint record with a particular ID will perform tests to determine whether the fingerprint that has been entered can be read properly or not a fingerprint sensor. Figure 7 shows the fingerprint record with ID # 1.

Fig 7. Fingerprint Successfully entered

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c. Results From the Display System SecaraKeseluruhan

Here is the view database software, applications and hardware systems that have been made in this study. Interface is made in the Web-based MySQL applications with PHP language. Display app can be seen on the following figure.

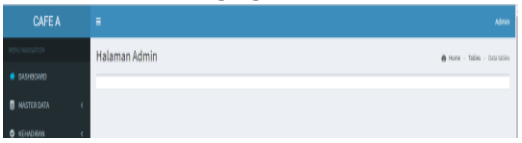

Fig 8 Home Ideas

In Figure 8 displays the home page for the web user.

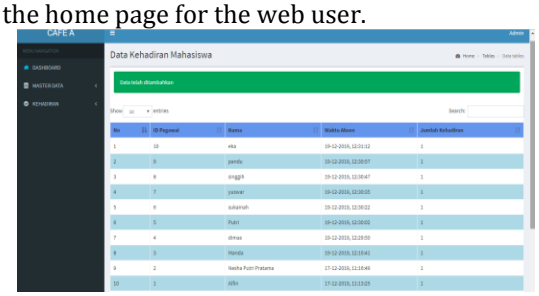

Fig 9. Data Presence

The image above displays pages of employee attendance data, whether already signed or not.

d. Results and Analysis System Success Rate At Record Process Fingerprint

The test is performed on the Record on fingerprintsensor as 3kali to ensure the validity of the fingerprint is entered. To analyze the accuracy of the system is done percobaansebanyak record 5 times to 10 different fingerprint, then obtained the percentage of success of such testing. The test results can be seen in the following table:

Table 3.
Fingerprint Record Test Results

No.	Test 1	Test 2	Test 3	Test 4	Test 5
fingerprint 1	✓	✓	✓	✓	✓
fingerprint 2	✓	✓	✓	✓	✓
fingerprint 3	-	-	-	-	✓
fingerprint 4	-	-	-	✓	✓
fingerprint 5	-	-	✓	✓	✓
fingerprint 6	-	✓	✓	✓	✓
fingerprint 7	✓	✓	✓	✓	✓
fingerprint 8	✓	✓	✓	✓	✓
fingerprint 9	✓	✓	✓	✓	✓
fingerprint 10	✓	✓	✓	✓	✓
Average Percentage Success = 86.67%					

Based on Table above, from 5 times to 10 fingerprint testing different percentage of

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success obtained by 86.67%. System who have failed when making a record can be caused by several factors, namely the fingerprint is not placed or shifted to the previous layout, the fingerprint there is sweat or coating may cause a failure to record, or on the order of overlap with the previous ID.

e. Results and Analysis of Accuracy of Response Time Reading Fingerprint

In this test can be seen repon time When fingerprint reading and compatibility whether the fingerprint is read by the system in accordance with the ID that has been registered previously. In the following table the response time can be seen on trial.

Table 4.
Results of Response Time PerSecond

No.	Response Time (s)	
	FP to Mikrocontroller	Mikrocontroller to Database
fingerprint 1	1.4	6:25
fingerprint 2	2.61	7:00
fingerprint 3	1.1	6:20
fingerprint 4	2.5	6:01
fingerprint 5	1:13	6:15
fingerprint 6	2:19	7:13
fingerprint 7	2:03	7:29
fingerprint 8	1:09	6:41
fingerprint 9	2:26	7.3
fingerprint 10	1:25	6
fingerprint 11	4	6:05
fingerprint 12	3.75	7:05
fingerprint 13	3.75	7:25
fingerprint 14	3:28	6.3
fingerprint 15	2:47	7:33
fingerprint 16	2.5	6:18
fingerprint 17	2:07	6:21
fingerprint 18	1.4	6.5
fingerprint 19	3:34	6:48
fingerprint 20	3:59	7:49
fingerprint 21	2.71	7.4
fingerprint 22	3.4	7:04
fingerprint 23	2.78	6.4
fingerprint 24	3.3	6:33
fingerprint 25	2.6	7:41
fingerprint 26	2:52	7:58
fingerprint 27	2:55	7:55
fingerprint 28	2:54	6:38
fingerprint 29	2:43	6:25
fingerprint 30	2	6.2
Total Average	2:48	6.7

Based on the above table 2 times send in data using 30 different fingerprints obtained an average response time for FP to Mikrocontroller of 2.48s while for Mikrocontroller to the Database by 6.7s. The variation value of the measurement response time is affected by the influence of scanning too fast, causing overheating of the appliance.

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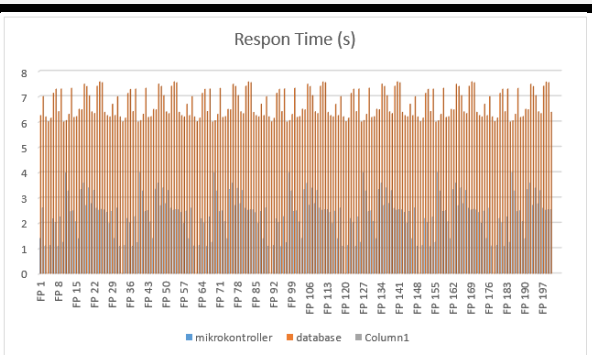

Figure 10. Testing Results Chart

Furthermore, in the image 10 be tested as table 4 by using charts of 200 entries, as the graph above shows the specifications for fingerprint C3 that the fingerprint can accommodate as many as 200 entries, if in excess of 200 entries, the data to 201 and seterus it will not be legible ,

4. Conclusion

In this study, based on the results perancagan and testing has been done, it can be concluded as follows:

a. The system is designed to experience failed at the time of the record can be caused by several factors, that is fingerprint is not placed or shifted. the previous layout, there is a fingerprint sweat or coating may cause a failure to record, or in the process, the sequence overlapping with IDsebelumnya.
b. The test results of presenttase system's accuracy rate is recording the fingerprint that is equal to 86.67% by testing the record process 5 times to 10 different fingerprints.
c. Variations in the value of the response time is affected by when scanning is too fast, causing overheating on the Tools
d. The results of system testing was conducted to determine the accuracy of the response time system for Fingerprint reading is fork FPtoMikrocontroller by 2.48s, while for Mikrocontroller to Database by 6.7s, with testing to 30 fingerprint reading process that has been registered previously.

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