



Student Attendance Information System Using Web-Based Nodemcu ESP8266

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ABSTRACT

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Presence or attendance in educational institutions such as Ibn Khaldun University Bogor is an important aspect in supporting the course of the lecture system, currently the attendance system at Ibn Khaldun University Bogor, especially in the Informatics Engineering study program, still uses a conventional system where students still have to sign an attendance sheet at the time lectures. In this study, there are two problem formulations (i) How to design and implement student attendance system devices using radio frequency identification (RFID) technology and WEB-based NodeMCU ESP8266, (ii) How to test WEB to display information on the presence of Informatics Engineering students using Black Box. The purpose of this study consisted of two stages (i) Designing and implementing a student attendance system device using radio frequency identification (RFID) technology and WEB-based NodeMCU ESP8266, (ii) being able to implement WEB testing to display information on the attendance of Informatics Engineering students using Black Box. Where in this study the framework has four stages, namely (i) analysis, (ii) design, (iii) implementation and (iv) testing. The results obtained in the research (i) Design and implementation of student attendance system devices using radio frequency identification (RFID) technology and WEB-based NodeMCU ESP8266 (ii) Implementation of WEB testing to display information on the presence of Informatics Engineering students using Black Box and get results appropriate.

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1. Introduction

Absence is a word that is absorbed from the Dutch language 'absentie' which means 'absence' while the opposite is 'presentie' which means 'presence'. In English it is called 'absence' and the opposite is 'attendance'. In general, absences are unplanned absences, but absences can also be caused by other factors such as illness or permission for certain reasons [1]. Currently attendance has been used both in schools, universities, companies, and offices, while presence or attendance at universities, especially in the field of lectures, is an important aspect that supports the course of the lecture system.

Ibn Khaldun University Bogor (UIKA) is a higher education institution in Indonesia that was founded in 1961 and is located on Jalan K.H. Sholeh Iskandar at kilometer 2 of Bogor City. Ibn Khaldun University Bogor (UIKA) has several faculties and one of them is the Faculty of Engineering & Science which is divided into 4 study programs namely Civil Engineering, Mechanical Engineering, Electrical Engineering and Informatics Engineering [2]. Currently, Ibn Khaldun Bogor University (UIKA) also implements a presence system in the Informatics Engineering study program, it's just that the presence system used is still conventional where students still have to sign attendance sheets during lectures, this also has a drawback where this conventional presence cannot manage. student attendance time in details such as how many minutes or hours a student is late. In fact, monitoring attendance time is very useful, either every minute or hour, to avoid students who often deceive attendance by leaving signatures with classmates.

Previous research has built a data management system for the attendance of lecturers in the Informatics Engineering study program, the system has the aim of managing lecturer attendance data and also to view lecturer attendance information via a web server [3]. It's just that this system is used not for students but only for the management of lecturers' attendance data, and the device is also deemed inefficient because data transmission is still using cables and the device cannot be carried anywhere. The purpose of this final project is to create a portable presence system for students by applying radio frequency identification (RFID) technology. The problem formulations in this study are (1) How to design and implement a student attendance system device using radio frequency identification (RFID) technology and NodeMCU. ESP8266



WEB based. (2) How to test WEB to display information on attendance of Informatics Engineering students using Black Box. Based on the formulation of these problems, the objectives of this study are (1) Design and implement a student attendance system using radio frequency identification (RFID) technology and WEB-based NodeMCU ESP8266. (2) Can implement WEB testing to display information on the attendance of Informatics Engineering students using Black Box.

2. Research Method

The research method in this study uses an experimental method and consists of four stages of a framework, namely analysis, design, implementation and testing. As shown in Figure 1.

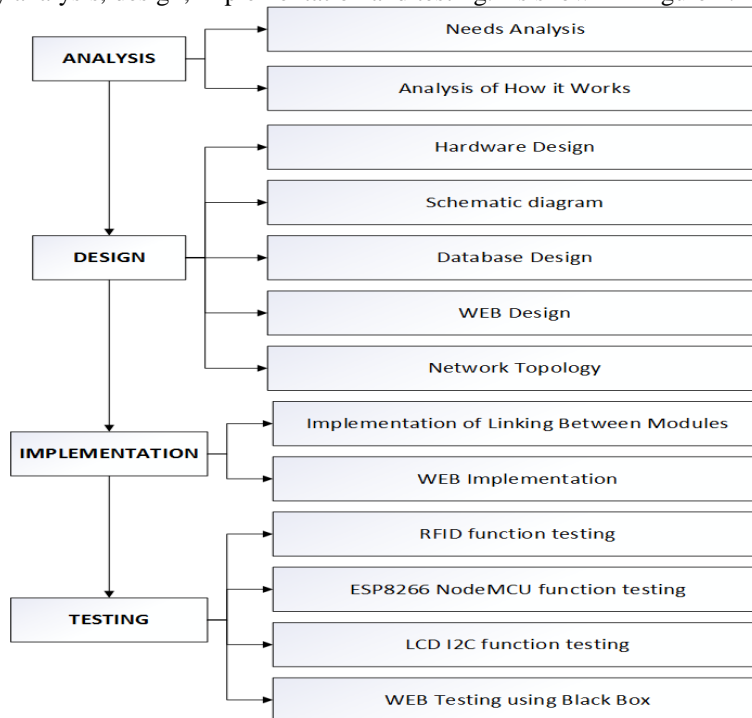


Fig 1. Research Method

3. Result

3.1 Analys

In the process of analyzing how to work explains how the system works in research. The following picture describes the analysis of how the system works:

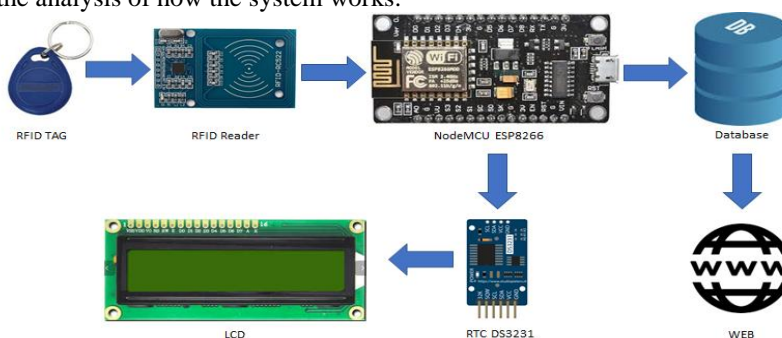


Fig 2. The analysis of how the system works

Figure 1 explains how the system works in this study starting with the user using the MIFARE RFID card for attendance. The MIFARE RFID card is brought closer to the RFID Reader, then the ID Tag information will be sent to the database via NodeMCU ESP8266, the ID Tag will be validated whether it is registered or not. If the ID Tag is registered in the database, the ID Tag can access the student attendance system and can view information on the web. The last step ID information will be displayed on the LCD, while the RTC DS3231 is only for determining the schedule time for a predetermined course.



3.2 Design

A. Schematic Diagram

At this stage, several schematic diagrams related to research are carried out, starting from the whole system schematic diagram, the RFID schematic diagram with NodeMCU ESP8266 and the NodeMCU ESP8266 schematic diagram with LCD. The following are some of the stages of the schematic diagram in this study:

a) Schematic diagram of the whole system.

The device used in the schematic diagram of the whole system is shown in table 1 and in Figure 2 shows the circuit is divided into 2 stages, namely (1) a series of RFID and NodeMCU ESP8266 schematic diagrams and (2) a series of NodeMCU ESP8266 schematic diagrams with LCD.

Table 1
Overall System Schematic Diagram

No	Device	Function
1	NodeMCU ESP8266	To process ID data from RFID and to connect to a web server via a WiFi network.
2	RFID Reader	For RFID Tag reader.
3	LCD I2C	The output from Arduino Mega 2560 and RFID that the ID card is detected.
4	Buzzer	Notification sound.
5	RTC DS3231	To determine the course schedule.

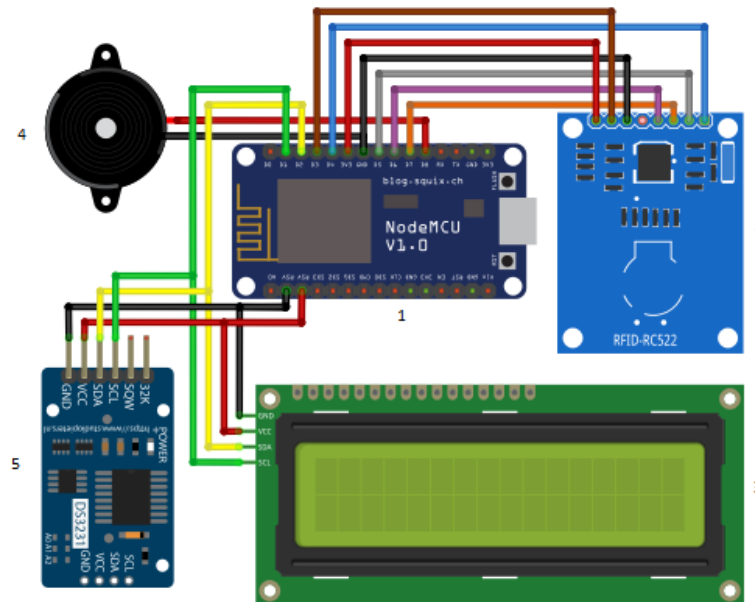


Fig 3. Overall System Schematic Diagram

b) The schematic diagram of the RFID Reader and NodeMCU ESP8266.

Figure 3 shows 7 outputs that are connected to each other at NodeMCU. The output pins used for the RFID Reader are D3, D4, D5, D6, D7, G and 3V consisting of pins D3 = RST, pin D4 = SDA, pin D7 = MOSI, pin D6 = MISO, pin D5 = SCL, pin G = GND and pin 3V = 3.3V.

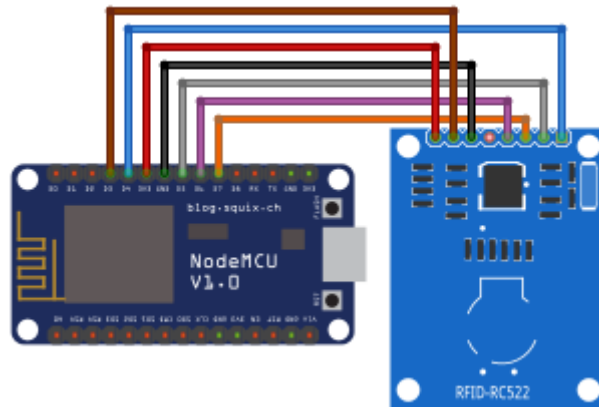


Fig 4. RFID Reader Schematic Diagram with NodeMCU ESP8266

c) **NodeMCU ESP8266 circuit diagram with I2C LCD**

In figure 4, the next design adds an I2C LCD to the circuit. The output pins of the NodeMCU used are pins D1, D2, G and VV consisting of pin D2 = SDA, pin D1 = SCL, pin VV = VCC and pin G = GND.

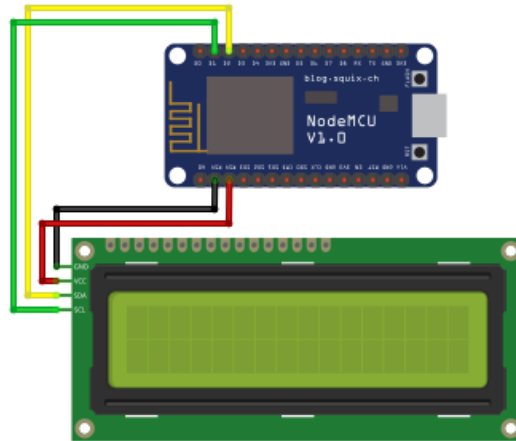


Fig 5. Arduino Mega 2560 Schematic Diagram with LCD

B. Web Design

a) **Entire Student Attendance Page**

The entire student attendance page is a page to display student attendance data from all courses, this page is on the 'Attendance Per Course' menu. The attendance page design per course can be seen in Figure 5



Fig 6. Overall Student Attendance Page Design

Table 2
Functions on the Overall Student Attendance Page Design

Nama Field	Fungsi
No.	Nomor tabel.
RFID	Untuk menampilkan keseluruhan data RFID mahasiswa yang hadir.
NPM	Untuk menampilkan keseluruhan data NPM mahasiswa yang hadir.
Name	Untuk menampilkan keseluruhan data nama mahasiswa yang hadir.
Time Attendance	Untuk menampilkan keseluruhan data waktu kehadiran mahasiswa yang hadir.
Course	Untuk menampilkan keseluruhan kategori mata kuliah.
Search	Untuk mencari data kehadiran.
Print	Untuk mencetak data kehadiran.
Delete	Untuk menghapus daftar kehadiran.

3.3 Implementation

a) Implementation of Attendance Pages per Course

Attendance per course page is a page to display student attendance data per course from the database to the web, this page is on the 'Attendance Per Course' menu. The attendance page interface per course can be seen in Figure 6.



Fig 7. Attendance Page Interface Per Course

b) Entire Attendance Page Implementation

The entire attendance page is a page to display student attendance data from all courses, this page is on the 'Attendance Per Course' menu. Attendance page interface design per course can be seen in Figure 7.



Fig 8. Overall Attendance Page Interface

3.4 Testing

This stage is conducting Web testing using a black box. Black box testing is carried out on Web pages so that the resulting Web matches expectations and the results are valid. The following is black box testing with Equivalence Partitioning that will be carried out, which will get results in the form of a Web that matches expectations and is valid.

Black box testing is carried out on the User page, with the aim that the resulting user page matches expectations and is valid. The following is the test table from the user page.

Table 3
Black Box Tesing

No.	Name Testing	Test Case	Result Yang Keep it up	Result Testing	Conclusion
1.	Change yuggo data with Username "Hendri" then Password "654321"	<i>Username: Hendri</i> <i>Password : 654321</i> <i>Level : lecturer</i>	The system will receive a new administrator or lecturer data and display a message "data saved successfully".	According to expectations	Valid
2.	Delete data Hendri	<i>Username :-</i> <i>Password :-</i> <i>Level :-</i>	The system will delete administrator or lecturer data and display a message "successfully deleted user data".	According to expectations	Valid

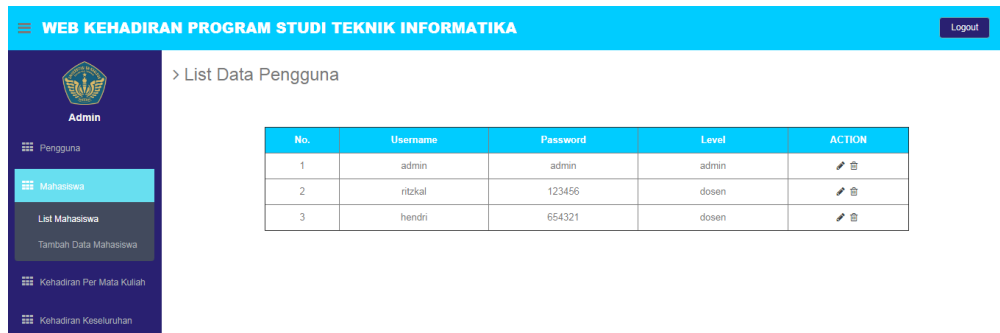


Fig 9. User List Testing Interface After Successfully Changing Data

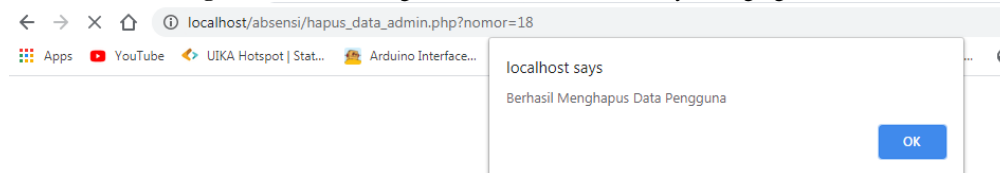


Fig 10. Testing Interface After User Data Is Successfully Deleted

4. Conclusion

Based on the research conducted, the results and discussion in the previous chapter, the following conclusions can be drawn: (1) The student attendance information system has been designed and implemented by connecting all modules including the RFID reader MFRC522, LCD I2C, RTC DS3231 and NodeMCU ESP8266. In testing this information system device, it can be connected to the database and can send student data who comes with RFID as their identity. (2) From all WEB testing using a Black Box which consists of five tests including login page testing, user page testing, student page testing, attendance page testing per course and overall attendance page testing, the appropriate results are obtained and the course scheduling system has also been used. scheduled.

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