

Smart Entrance Access to the Computer Laboratory

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Smart Entrance Access to the Computer Laboratory

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Abstract. The development of information technology is growing rapidly. Efforts to increase effectiveness and convenience in daily life are needed so that performance is more efficient. At SMP Negeri 2 Godean, the attendance system for entering the laboratory is still manual. The teacher must record student attendance in a book, then recap manually. This causes the attendance system and access to the laboratory to be long. To overcome this, the researchers built an automatic laboratory entry system that has features: automatic attendance and provides automatic access to enter the laboratory. Laboratory visitor data will be stored in this system. The data in the system includes teacher data, student data, laboratory usage schedules. This research has succeeded in developing an automatic laboratory entry system, this system can record student attendance and provide laboratory entrance access for students.

Keywords: Fingerprint, Microcontroller, Smart room, Smart access, IoT.

INTRODUCTION

Information technology continues to develop which will affect our behavior today. The development of information technology is accompanied by network connections and embedded systems that allow us to control, monitor from mobile phones [1]. IoT uses various sensors to obtain information, such as RFID devices, infrared sensors, GPS systems, laser rights and other devices, aims for the integration of the entire system connected to the network automatically and in real time for object viewing, location, monitoring [2]. Based on [3] the development of IoT-based smart campuses allows academic activities to be carried out automatically and in real time.

The design of this smart entrance laboratory is based on a laboratory that still uses conventional methods by manually taking notes on the student attendance list. The concept of this smart entrance laboratory consists of a student attendance system that is used for access to enter the laboratory. This paper contains the design of making a smart laboratory consisting of student attendance and access to the lab, so that teachers no longer manually record student attendance lists. The results of this smart laboratory produce a smart laboratory design at the junior high school of Negeri 2 Godean that can record student attendance and record the number of students who enter the laboratory.

MATERIAL AND METHODS

Literature Review

Research by [3] describes the development of smart campuses using IoT. Smart campus supports a campus connected via online by sensors. technology-based learning can be done in real time. This development is carried out on smart education, smart parking and smart rooms. Laboratory Automation using smartphones and computers developed by [4] IoT devices control and unify systems used in various types of devices. Devices connected to cloud servers are controlled by admins who provide a number of users connected with a number of sensors. The system is designed efficiently, and allows connection and control of a different number of devices. Research by [5] implements IoT in electrical equipment, such as lamps, air conditioners, fans, projectors in laboratories with sensor input. Data exchange occurs in real time.

Material

In this project the materials used consist of: Arduino Uno type microcontroller, finger print module, keypad, ethernet shield, and 16 x 2 LCD. The microcontroller serves as a control in this system. Selection of control with a microcontroller based on the effectiveness of control with a microcontroller. Microcontrollers can be used in a variety of simple to complex applications [6]

The finger print module functions as an input component to the microcontroller. Finger print reads fingerprint data which is then processed in the microcontroller for further processing as desired. Fingerprint Recognition System is an automatic system that confirms a person's identity based on the fingerprint pattern. How it Works Fingerprint analysis for purposes is done by comparing the features extracted from a person's fingerprint [7]

The LCD installed as an input component serves as the user interface. The LCD will display the status of someone's fingerprint reading. Someone whose fingerprints have been recorded and stored in the system will have access to enter the laboratory, while someone whose fingerprints have not been recorded will not have access to the laboratory.

System Diagram

This system consists of a fingerprint presence system, which is connected to a router. The router serves to connect the fingerprint attendance system to the database. The way this system works is: if someone with authority is detected in the fingerprint attendance system, the laboratory door will open. The data from the fingerprint will be forwarded to the database. The working principle of the system can be seen in Figure 1 below.

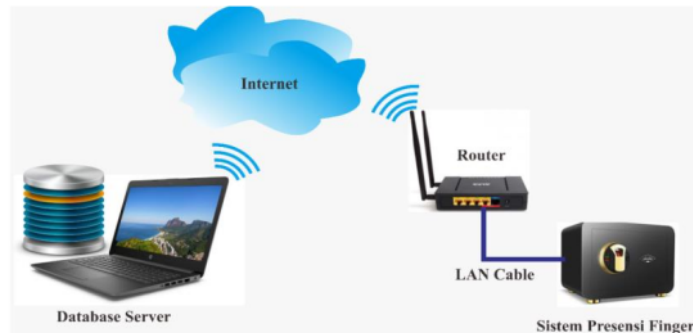


FIGURE 1. System diagram smart entrance access

Wiring Diagram

Hardware components consist of Arduino type microcontroller, ethernet shield, keypad, fingerprint module, 16 x 2 LCD. The fingerprint module is connected to Arduino pin 0 and pin 1. Pin 0 and Pin 1 are Tx and Rx pins that function as serial communication. The Keypad module is connected to Arduino pins A0 and A1, parallel connected to the LCD module. The LCD module works with I2C, thus saving the pins on the Arduino. Wiring diagram can be seen in Figure 2 below.

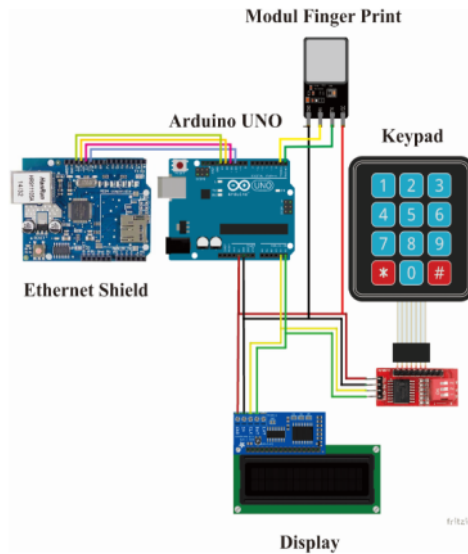


FIGURE 2. Wiring diagram system

RESULT AND DISCUSSION

The system that has been built consists of hardware and software. Hardware consists of Arduino type microcontroller, 16 x 2 LCD, fingerprint module, and keypad. Performance of the hardware system goes well. The fingerprint module can recognize the user's fingerprint pattern. The recognized fingerprint pattern data is then sent to the microcontroller for further processing. LCD also works fine. The LCD is capable of displaying the user's status, whether he/she is granted access to the laboratory or not. Overall the hardware system runs smoothly. The hardware system can be seen in Figure 3 below.



FIGURE 3. Hardware system

In addition to the hardware system, access to this laboratory also consists of software. The software is built with the `codeigniter` framework. This software serves as a user interface in recording students entering the laboratory. This system is an integrated attendance system. In this system there is a student, teacher, room, lesson schedule, and admin interface menu.

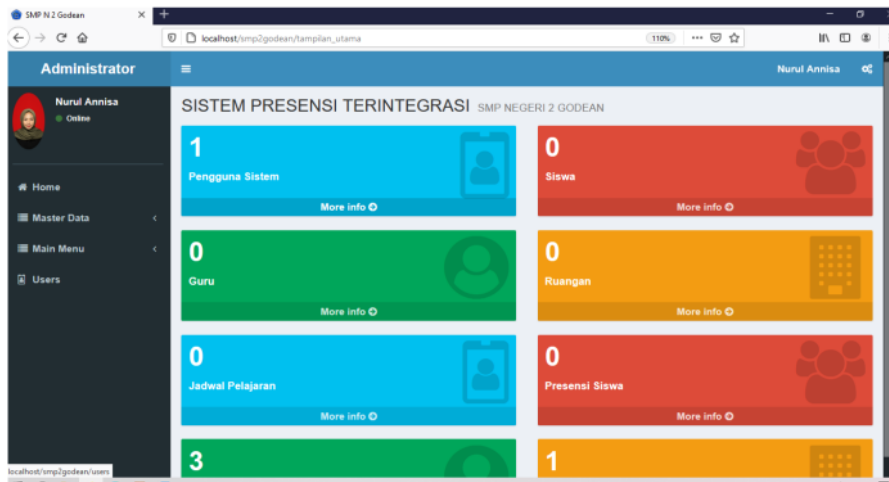


FIGURE 4. Dashboard System Smart entrance laboratory

In the admin menu displays the user data display, add data, user roles and edit. Add data consisting of number, photo, code, employee number, teacher name, title, level, gender, status and edit. While in the student menu, the added data consists of number, photo, student registration number, full name, place of birth, date of birth, class, status and edit. The system being tested succeeded in storing data in the database, and the interface software created was able to display student data entering the laboratory. The laboratory entry attendance display can be seen in Figure 5 below.

NO	KODE	NIS	NAMA SISWA	MAPEL	KELAS	TANGGAL	JAM
1	PR01	7002	ADELIA LIA	IPA	7B	2020-10-06	07:01:00

FIGURE 5. Presence data display

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CONCLUSION

The system has been running well. In the field implementation, the system managed to store data on visitors who entered the laboratory. Visitors who enter the laboratory do not need a manual key and manual presence. To enter the laboratory, visitors only need to attach a finger whose fingerprint has been recorded. Someone who can enter the laboratory is a person who is already registered in the system. System Hardware and Software running well.

ACKNOWLEDGMENTS

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