DESIGN OF A DOOR SECURITY SYSTEM THAT CAN BE ACCESSED USING FINGER PRINT AND PIN BASED ON THE INTERNET OF THINGS

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ABSTRACT
The purpose of the research is to design a door security system that can be accessed using a fingerprint and PIN based on the Internet of Thing (IOT). The fingerprint that has been accessed will provide data to the microcontroller to be processed which will then give a command to Em-door Lock to unlock the door. In addition, this security system can also be monitored through Android or IOS smartphone applications, namely Telegram. This tool uses Arduino UNO microcontroller, NodeMCU ESP8266, Electromagnetic lock, Fingerprint, Keypad, Relay, door sensor, Arduino IDE, and Telegram. The hardware and software will then be configured between one device and another so that it becomes a door security system. The research method used in this research uses the Prototype method which consists of Rapid Design, Build Prototype, User Evaluation, Improve Prototype, Implementation and Maintenance. The results of the research conducted show that the door security system can work in recognizing fingerprints that have been registered and receiving PIN input accurately. besides that it can be integrated with the internet of things as monitoring the status of the door through the telegram application using the bot that has been installed. in this study there is also an evaluation of not being able to find out the ownership of fingerprints when accessing the door.

Keywords *Fingerprint, PIN, Internet of Things, Elegtromagnetic Doorlock, Arduino ATmega328, NodeMCU*

1. INTRODUCTION

Security technology is one of the security fields used in modern times like today, in security technology it also has media and ways of using the security technology system, for example, it can use manual security such as padlock locks for fences and doors, even in offices still using manual systems like that. There is also a system that uses an automatic / internet system, where the system can be used or operated using a network and can also be accessed remotely, the system is commonly called the internet of things base. Internet of Things commonly abbreviated as IoT is an advanced technology that has a concept that aims to expand and develop the benefits of continuous internet connectivity[1]. The method that will be used is the prototyping method, using this method can make it easier and simpler to carry out system development that works continuously improved through collaboration between clients and analysts[2]. The reason for using the model method is to be able to understand the desired system specifications and speed up the application development process by creating a prototype first. serves as a demonstration of the information system.

2. THEORETICAL FOUNDATIONS

There are several theoretical foundations needed in this research.

2.1 Internet of Things

The Internet of Things, also known as IoT, is a conceptually advanced technology that has the goal of extending the benefits of always-on Internet connectivity[1].

2.2 Fingerprints sensor

Every human being has a different fingerprint, distinguished by a unique stroke pattern on each finger. at a glance, fingerprints can be seen to have visual characteristics in the form of shape and direction of the groove[3]. Access using fingerprints can only be unlocked by individuals.

2.3 Personal Identification Number

One way of accessing in a security system is in numerical form, with the aim of adding security to a device.

2.4 Telegram

Telegram is a program in the form of a smartphone application by being one of the options to use, and can be used through several devices simultaneously[4]. In telegram can create bots for the needs of each user

3. RESEARCH METHOD

The method used in this research uses the prototype method to describe the system, so that the client or system owner has a clear picture of the system to be built by the development team. In some situations, the prototype develops into the final version of the information system. In other cases, prototypes are intended only to validate user needs and are discarded afterward. In the prototype method, there are 7 stages to conduct research, namely, needs analysis, tool design, tool design, system program, system testing, implementation and maintenance, and system evaluation.

4. RESULT

4.1 Analysis

The results of the needs analysis by conducting interviews that will use this Security system require several Security systems desired by users, namely as follows;

a) The security system needed by users is a security system that can lock the door automatically using a magnet.

b) Security systems that can be accessed using fingerprints and PINs to make it easier to access but still safety.

c) Can monitor the status of open doors using a website or smartphone application

4.2 Tool Desaign

Drawing or designing a device or product for a reference in the process of making a device or product, with the aim of being more systematic and directed so as to reduce or minimize an error.

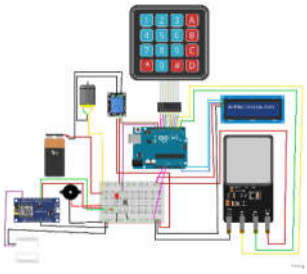

Figure 1 Tools Desaign

4.3 Designing tools

In figure 2 the results of the design and integration of the tools to be used. The Arduino ATmega328 module on the left is integrated with several modules, namely pushbotton, LCD display, keypad, and fingerprint. In the right picture is the NodeMCU ESP8266 module, one of the Arduino modules that can be connected to the internet network, and the module is integrated with a buzzer, reedswitch / door sensor, and also the internet network to connect to Telegram Bot as monitoring that the door is open or not and the door has been locked again or not.

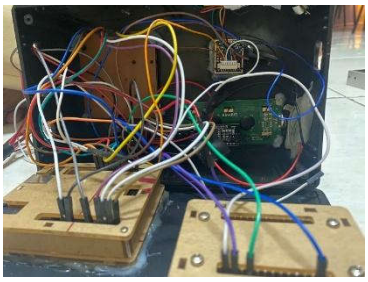

Figure 2 Tool design results

4.4 Program the System

Door security system tools that can be accessed using fingerprints and IoT-based PINs require software, because there are two modules that need to be programmed in order to instruct several components used, and the two modules are Arduino UNO, and ESP8266, for the ESP8266 module used to connect to the internet network and connect to the telegram application. To program the two modules using Arduino IDE software.

4.5 System testing

Testing a system that has been designed, the system tested is a fingerprint detection system, fingerprint detection accuracy, pin system, door sensor, and voltage measurement. With the system trial to ensure the system to be used, whether it runs well or not. The results of this system trial are good.

Table 1. Fingerprint detection accurancy

Experiment	Description		Amount
	Succesful	Failed	
First	15x	5x	20x
Second	18x	2x	20x
Thirth	16x	4x	20x
Fourtht	19x	1x	20x

Fifth	17x	3x	20x
Total	85x	15x	100x

In table 1 of the five trials with each trial of 20 times and a total of 100 trials, that the fingerprint sensor can work well because the experiment succeeded 85 times and failed 15 times. With a presentation of 85% success and 15% failure [1]

4.6 Implementation and maintenance [2]

After installing the tool design that has been designed at the location to be determined, the tool designer makes a prototype door to ensure that the equipment that has been designed runs smoothly and then implemented. [3]

After implementation, maintenance is carried out on the equipment so that this equipment can be used in the long term. In general, an electronic device should have maintenance, in order to minimize damage and also reduce the performance of the equipment that has been designed and implemented.

4.7 System evaluation

After carrying out the previous stages, from analysis to implementation and maintenance, the researcher evaluates the system and equipment that has been designed according to existing needs, thus the researcher's evaluation is as follows; [4]

a) The writing on the LCD equipment is less clearly visible, due to the effect of the color of the lights on the LCD which uses blue.

b) The door status notification sent to the Telegram application has a delay due to the network connection connected to the NodeMCU ESP8266.

c) In this equipment, the fingerprint detection system has not been able to find out the ownership of the access fingerprint.

5. CONCLUSION

To design and build a door security system that can be accessed using fingerprints and IoT-based PINs with the prototyping method is to develop a model or prototype of the door security system to be made before it is fully implemented. This security system utilizes biometric technology (fingerprint) and a PIN code that uses a keypad as access to open the door and can send door status notifications via telegram. Evaluation Results of the door security system tool that can be accessed using IoT-based fingerprints and PINs, cannot detect the ownership of accessing fingerprints and monitoring via telegram using bots cannot send notifications of who accessed the system.

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