DESIGN OF AUTOMATIC UNLOCKING SYSTEMS WITH BASED NOTIFICATIONS RFID (*RADIO FREQUENCY IDENTIFICATION*)

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Abstract

Security is the most important thing in everyday life, there are lots of thefts or break-ins of a security system because it is not properly protected. Plus there is no additional notification system on conventional locks that are commonly used which can provide information on anyone trying to access the door. Automatic Unlock System With RFID Based Notification (*Radio Frequency Identification*). Aim to plan*prototype* automatic unlocking system with RFID based notifications. Work system from*prototype* it is controlled using the NodeMCU ESP8266 as the brain of*prototype* which is equipped with RC522 RFID sensors, servo motors, and*Touch* Sensor to open the door from the inside. This study uses a type of qualitative research and uses methods*Research and Development* (R&D). Based on the test results, the system can read the E-KTP card to open the door and the system can also send notifications to the telegram application. RFID testing is known sensors can read cards starting from distance of 0.0 cm to 1.8 cm. In testing the RFID response time, it is known that the time required ranges from 2.59 to 2.86*second*. Next test the response time*touch* sensor, the response time required until the door is opened an average of 1.99*second*.

Keywords: RFID, NodeMCUESP8266, Automatic Lock, Prototype, E-KTP, Sensor

1. Introduction

Science and technology are currently developing very rapidly, including in the field of*electrical engineering*. As we already know, almost all of the manufacturing equipment is already using automatic technology. For example, to open a door that we usually do manually by entering a key, this can be handled with electronic equipment that can open doors automatically by controlling using a card sensor or commonly called RFID (*Radio Frequency Identification*) so that the use of space becomes efficient and increases security in the room. RFID (*Radio Frequency Identification*) is a technology that uses radio waves that can be used to identify a particular object in accordance with what has been programmed in it.

Currently security is also the most important thing in everyday life, there are lots of thefts or break-ins of a security system because it is not properly protected. Plus there is no additional notification system on conventional locks that are commonly used which can provide information on anyone trying to access the door. With the rapid development of today's technology, it is necessary to develop a security system that can eliminate the weaknesses in conventional locks, a lock system is needed that can provide direct

notification to the owner if someone tries to access it.

2. Research methods

A. Approach and Type of Research

This study uses a type of qualitative research and uses methods*Research and Development* (R&D). *Research* means to search again, in other words to carry out investigations in order to obtain facts or data to obtain additional information. Research methods*Research and Development* (R&D) is a research method used to produce certain products and test the product.

1. Potential and Problems

Potential is anything that when utilized will have added value. While the problem is a deviation between what is expected and what happened.

2. Collection of Data or Information

The process of collecting information is carried out factually and can be used as material for planning certain products as expected.

3. Product Design

Product design is a series of efforts to study and plan functional, ergonomic, and aesthetic wearables so that they become more valuable and useful for users.

4. Planning Level

The design stage aims to produce a design that meets the requirements determined after the planning stage.

5. Product Testing

Product trials aim to determine whether the product made is suitable for use or not. Product testing is carried out in three stages, namely:

a. Testing the distance between the card and the sensor

b. RFID response time testing (*Radio Frequency Identification*)

c. Response time testing*touch* sensor.

B. Research Stage

At the research stage, researchers start from the model planning session to the final product to be made. The stages used include:

1. Planning Stage

This stage is the initial stage in designing a shaped product*prototype* automatic unlock system with RFID based notification (*Radio Frequency Identification*) which covers the preparation of tools and materials to be used.

2. Planning*Prototype*

After all the equipment is adequate, a circuit and programming is needed which will be made in the form of a physical circuit and will also be programmed in the computer to be entered into Arduino so that the device can be controlled using Arduino.

3. Product Testing

Prototype will be tested starting from testing the distance of the card with RFID (*Radio Frequency Identification*), RFID response time testing (*Radio Frequency Identification*), response time testing*touch* sensor will then be seen the results of*prototype* which has been tested whether everything can run as expected or not.

C. Research Flowchart

Flowcharts are used to describe the algorithms that researchers use in this study. Picture*flowchart* can be seen in Figure 1.
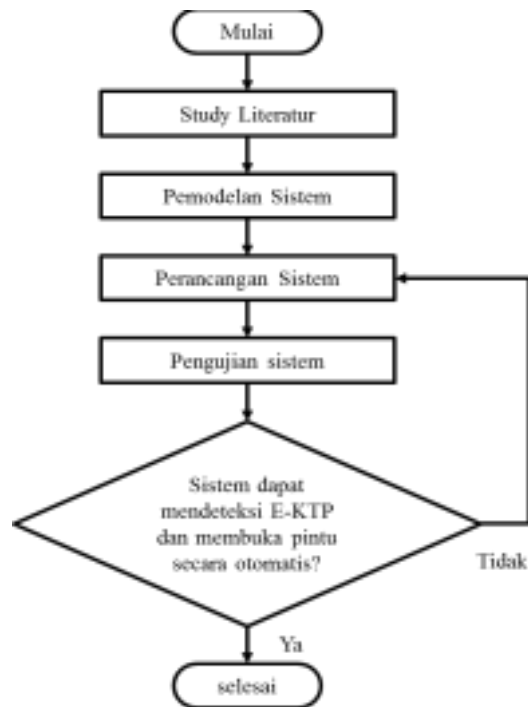
Figure 1. *Flowchart* Research Flow.

D. Research Tools and Materials

Tools and materials to be used during the design and assembly process*prototype*e automatic door opening system with RFID based notification (*Radio Frequency Identification*) as follows:

a. Tools and materials used:

a. Gunting

b. Solder

c. Glue Shot

d. Laptop

It is.*Wire stripper* (Cable cutter)

f. Tang

g. Software Arduino IDE

h. *Radio Frequency Identification* (RFID) MFRC-522

i. Motor servo MG90S

j. NodeMCU ESP8266

k. E-KTP

l. *Touch* Sensor TTP223

m. Kabel USB

n. Cable*jumper*

o. Solder wire

p. Isolation

b. Automatic Door Open Prototype Diagram

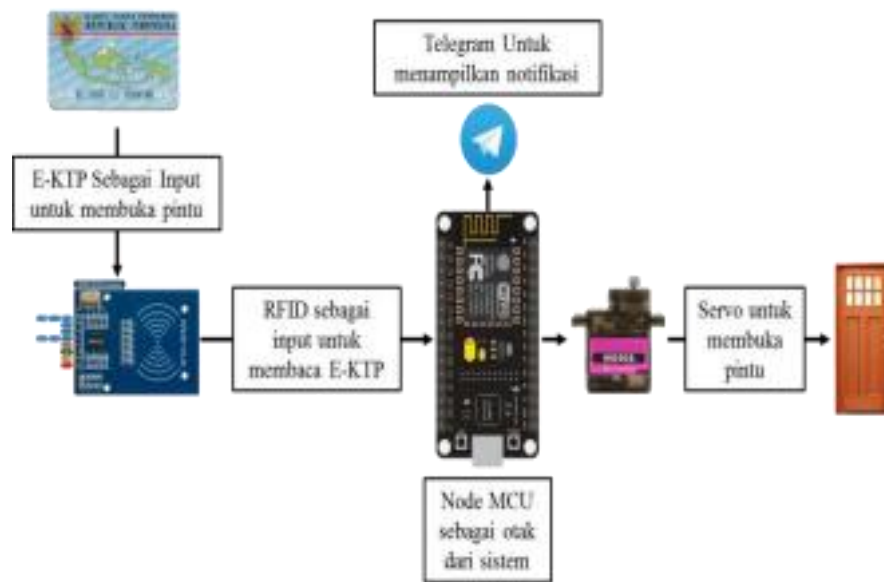Workflow*prototype* open automatic doors are generally designed based on a block diagram, can be seen in figure 2.

Figure 2. Workflow*prototype* open the automatic door.

Functions of Each Block

a. E-KTP: Serves as input to be sent to the RFID reader. b. RFID reader: serves to read the ID number contained in the E-KTP chip. Data stored on the chip will be sent via radio waves after*taq* receive radio waves from the reader then the data will be sent to the microcontroller.

c. NodeMCU ESP8266: functions as a microcontroller and also as a link to the internet network.

d. Servo: works to open the door when the entered input matches the data in the program.

e. Telegram application: functions as a media for receiving notifications.

3. Discussion and Research Results

A. How the Tool Works

The flowchart describes the process flow from*start* to finish. In this case, the work process is regulated by the program that works in the controller. Moment*start*, the program will work and RFID will begin to identify the E-KTP card that is attached.

Data from the card will be read by RFID and sent to NodeMCU ESP8266, if the data

from the card matches the program then the servo will rotate 180˚ until the door opens and NodeMCU ESP8266 will send a notification to the telegram application in the form of the name of the owner of the E-KTP. If access is denied so that the servo does not rotate and the door does not open, the NodeMCU ESP8266 also sends a notification to the telegram that the card used is not registered.

To open the door from inside the room, you only need to touch a button*touch* sensor without the need to use a card, and when the servo works the door will open automatically.
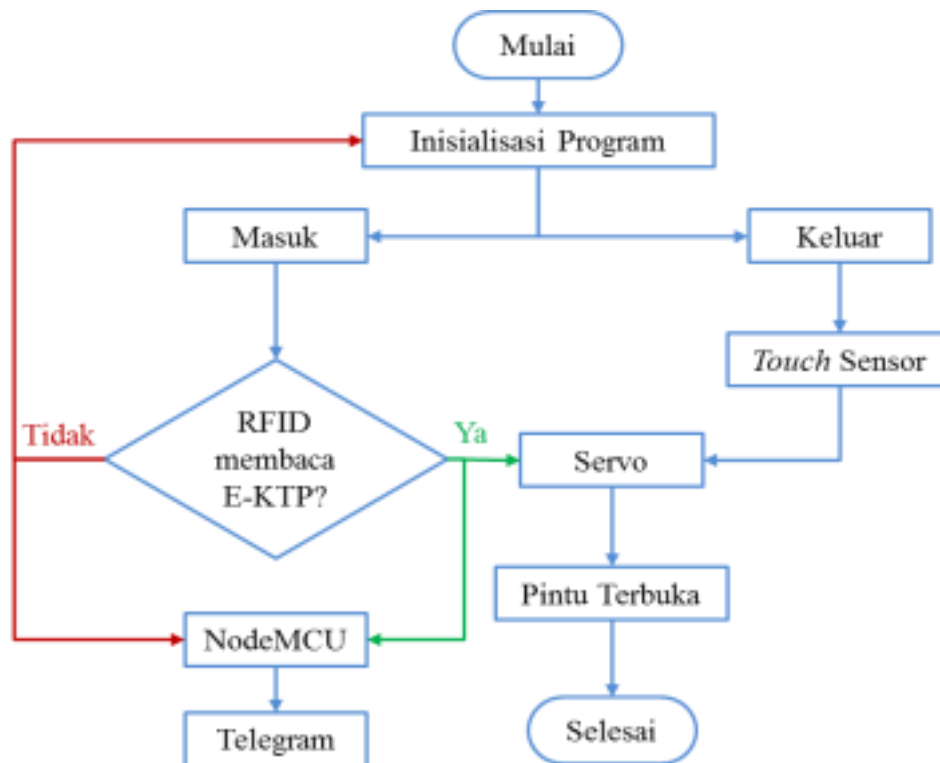

Figure 3.*Flowchart* How the Tool Works.

1. Testing the distance between the card and RFID (*Radio Frequency dentification*) RFID testing is carried out by bringing the E-KTP card closer to the sensor, if the RFID sensor reads or identifies the ID number on the E-KTP card according to the program, the servo will rotate 180˚ degrees so that the door opens.

TABLE 1. Testing the distance of the E-KTP card that can be read by the RFID sensor.

Testing to	Card spacing with sensor	Door condition
1	0,0 cm	Open
2	0,5 cm	Open
3	1,0 cm	Open
4	1,5 cm	Open

5	1,8 cm	Open
6	1,9 cm	Closed
7	2,0 cm	Closed

From the test results in table 1 above, it can be explained that RFID can read the chip inside an E-KTP card if the card is brought closer from a distance of 0.0 cm to a distance of 1.8 cm to the RFID sensor.

2. RFID Response Time Testing (*Radio Frequency Identification*) In this test it will be discussed how long the RFID response time is after the card is pasted until the door is opened using 10 samples.

TABLE 2. RESPONSE TIME TESTING

Test When	RFID Response Time(s)			
	3 Sample	5 Sample	8 Sample	10 Sample
1	2,81 s	2,55 s	2,56 s	2,81 s
2	3,00 s	2,65 s	2,62 s	2,76 s
3	2,34 s	2,96 s	2,78 s	2,68 s
4	2,92 s	2,83 s	2,23 s	2,23 s
5	2,32 s	2,18 s	2,92 s	3,33 s
6	2,77 s	2,03 s	2,18 s	2,90 s
7	2,27 s	2,75 s	3,23 s	2,74 s
8	2,65 s	2,69 s	2,69 s	2,42 s
9	2,38 s	2,43 s	2,33 s	2,88 s
10	2,51 s	2,86 s	2,91 s	3,85 s
Rate-Rata	2,59 s	2,63 s	2,63s	2,86 s

From the test results in table 2 above, we can see that the response time based on the above test is not much different between 1 *sample* E-KTP cards up to 10 E-KTP cards.

3. Response Time Testing *Touch* Sensor

Response time testing *touch* the sensor is carried out to see the response time of opening the door when the sensor is brought closer to the hand. The purpose of the test is to find out how fast the system can open the door from the inside.

TABLE 3. RESPONSE TIME TESTING *TOUCH* SENSOR

Testing the	Response TimeTouch Sensor	Door condition
1	1.52 Seconds	Open
2	2.18 Seconds	Open
3	2.09 Seconds	Open
4	1.89 Seconds	Open
5	2.28 Seconds	Open
6	1.93 Seconds	Open
7	2.12 Seconds	Open
8	2.03 Seconds	Open
9	1.88 Seconds	Open
10	2.01 Seconds	Open
Rate-Rata	1.99 Seconds	Open

From the test results in table 3, it can be seen that the average time needed by *touch* sensor to open the door from the inside is 1.99 seconds.

B. Discussion

Research with the title Design of an Automatic Unlocking System with Based Notifications *Radio Frequency Identification* (RFID) aims to design a *prototype* RFID based automatic unlocking system. To achieve these objectives, the researchers used the method *Research and Development* (R&D) with research steps which broadly cover potentials and problems, data or information collection, product design/planning stage, design stage, usage trials.

The planning stage is the first step taken to build an automatic door opener system in the form *prototype,* which includes the preparation of tools and materials to be used. The next stage is design *prototype* where after all the equipment has been adequate, then a series is made *software* arduino IDE in the form of a physical circuit to be programmed into a computer. Furthermore, product testing is carried out which is the last step taken to build a system where *prototype* that have been built will be tested starting from E-KTP, RFID sensors, NodeMCU ESP8266, Telegram Bot, servo motors, *Touch* Sensors, Doors, then the results will be seen *prototype* that has been tested whether it is running as expected.

The test is carried out in three stages, consisting of RFID testing which is carried out by bringing the E-KTP card closer to the sensor at a certain distance, if the RFID sensor reads or identifies the ID number on the E-KTP card according to the program, NodeMCU ESP8266 will give an order to open the door and send notifications to the telegram application when someone accesses it. The tool built is said to be successful, from the test results it is known that the sensor can read cards from a distance of 0.0 cm to 1.8 cm.

The second stage is to test the RFID response time, namely to find out how long the RFID response time is after the card is attached until the door is opened, from the test results it is known that the response time needed by RFID to be able to open the door on average ranges from 2.59 to 2.86*second*. Next test the response time*touch* the sensor is done to see the response time of opening the door from inside the room when the sensor is brought close to the hand, from the test results it is known that the response time required until the door is opened is an average of 1.99*second*.

4. Conclusion

Based on the results of research that has been done regarding the design of an automatic unlocking system with RFID-based notifications (*Radio Frequency Identification)* Successful design*prototype* automatic unlock system with RFID based notification (*Radio Frequency Identification*). Work system from*prototype* it is controlled using the NodeMCU ESP8266 as the brain of*prototype* which is equipped with RC522 RFID sensor, servo motor, and*Touch* The sensor for opening the door from within this system can read the E-KTP card to open the door and the system can also send notifications to the telegram application.

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