

# Automatic Door Based on Radio Frequency Identification (RFID) and Password in Electrical Engineering Laboratory

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**Abstract** – RFID (Radio Frequency Identification) systems are used as personal identification cards in the room access system especially in Electrical Engineering Laboratory. This system is intended to maintain the security and privacy of the room from someone who does not have the authority to enter the room. This security system uses a two-tier security system, namely through an RFID identity card and security code. The design and implementation of this system, an electric key work system is evaluated based on the solenoid component and the password used when accessing the room. RFID tags used in this system are in the form of "Mifare RFID Card 13.56 Mhz" cards and store unique codes used as personal identification. This code is read by the RFID reader in validating its authority with Arduino Mega 2560 to regulate the system of electric locks and passwords used to open the door. From the test results, 100% RFID tags can be recognized by the RFID reader, 100% RFID tag and password reading system is successfully used to access the room.

**Index Term** - *RFID, security code, Arduino Mega 2560, security system.*

## I. INTRODUCTION

### 1.1. Background

The growing human mindset in developing science and technology, and supported by high curiosity makes science and technology grow rapidly over time. Technology contributes greatly to development in various fields. Especially in the area of security and practicality. In the field of security, with the existence of technology, safeguarding things such as safeguarding a space that can only be entered by certain people can be stronger. In the field of practicality, with the existence of technology, it is easier for humans to carry out their activities such as doors that can be opened and closed by themselves without being operated by humans.

The absence of safeguards against anyone who will go through the automatic automatic door makes the room that can be entered through the automatic door becomes vulnerable to criminal activities such as theft, misuse and others.

Therefore there is a need for innovation and development of this automatic door to overcome this problem, namely by adding RFID (Radio Frequency Identification) reader, RFID card, keypad, arduino mega 2560 microcontroller and PLC as access to be able to enter the restricted space by the door this automatic.

## II. LITERATURE REVIEW

RFID or Radio Frequency Identification is a data telecommunication device using radio waves to exchange data between one reader with an electronic tag attached to a particular object (Daniel et al., 2007). Data communication technology between an RFID reader with electronic tags (RFID tags) in this system are contactless, real time and wireless. Data identification on RFID tags is carried out through radio frequencies that propagate through the air media at a certain range according to the features possessed by each RFID module (consisting of RFID readers and RFID tags) used. In general, RFID tag data that is unique is stored or embedded in a chip card so that the influence of natural conditions such as dust, dirt or air temperature will

not reduce the quality of data communications that occur.

The features possessed by RFID technology are the advantages of RFID technology when compared to other identification systems such as barcodes and magnetic cards. But this advantage will be relative because it will depend on the use of an identification technology in an application that will be implemented. This technology has been used in various applications related to object identification systems in several previous studies, such as opening doors, accessing computers, turning on motorbikes, and controlling equipment in office spaces such as lights, computers and lighting (Graafstra, 2007).

Previous research that had been made was "the use of the RFID System as a Room Access Limit" (Hendi Handian Rachmat, Gilbert Allegro Hutabarat, 2014) with a system design like Figure 2.1

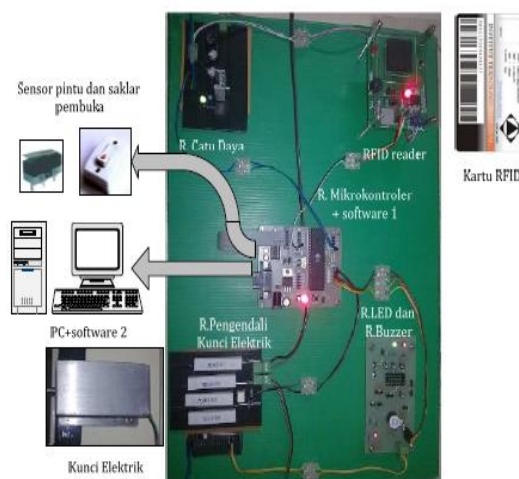


Figure 2.1 Design and realization of RFID systems as Room Access Limit

Researchers have also conducted research in 2013 concerning RFID applications “ the Development of Monitoring Software for Fertile Detection of Dairy Cows Using RFID Technology to Increase the Success of Artificial Insemination”. An overview of previous research, as shown in Figure 2.2 as follows:

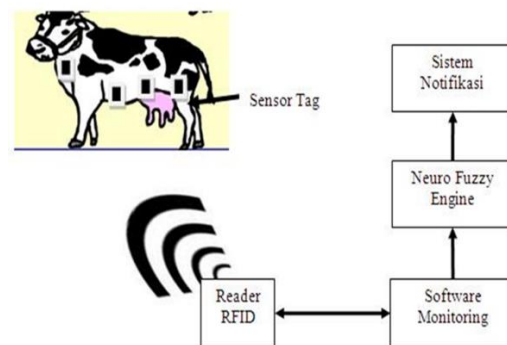
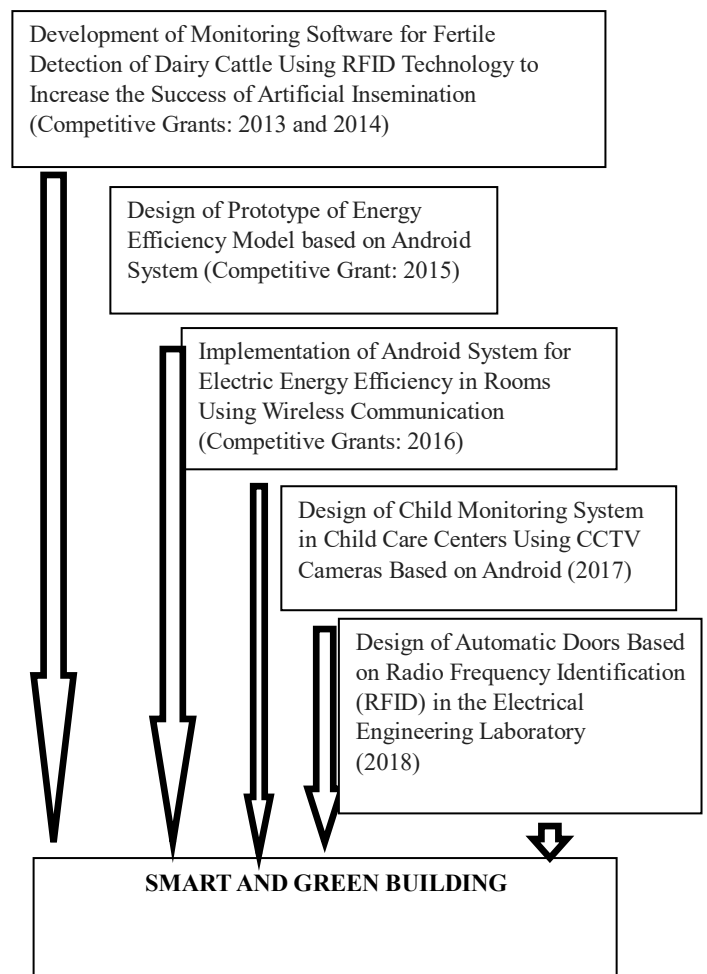


Figure 2.2 Monitoring Diagram of Fertile Period Detection of Dairy Cows Using RFID Technology (source: Syahid, 2013)

Through this research the Duple Security System With RFID And Password Based On Arduino Mega 2560. The road map is as follows



### III. DISCUSSION

#### 3.1 Work Description

To enter the room, the new door can be opened after the RFID card is scanned by the RFID reader and enter the password according to the RFID card. If the password entered is incorrect, the door will not open. And if the password entered is correct, the 5 Vdc relay will be active and provide input to the PLC. The new door will open after the outer door sensor is active, and will close after the inside and outside door sensors are not active. If you have entered the password correctly, but the sensor door is not active for 10 seconds, the door will not open even if someone will enter the laboratory room. To open the door again, have to scan the RFID card and enter the card password correctly again. Whereas if someone wants to get out of the laboratory room, the door will open by itself without having to scan the card and enter the password correctly.

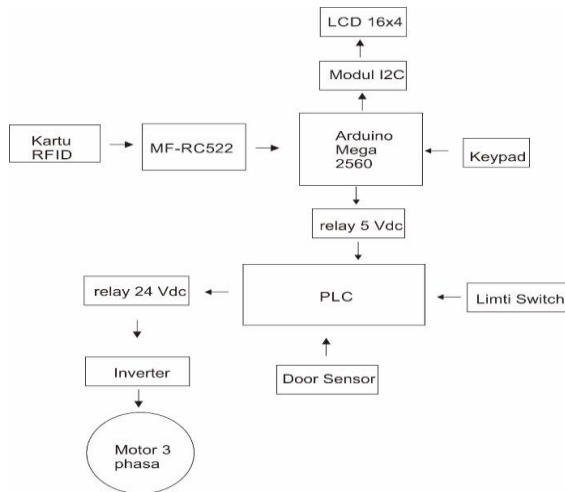


Figure 3.1 Block circuit diagram

#### 3.2 Circuit of Tools

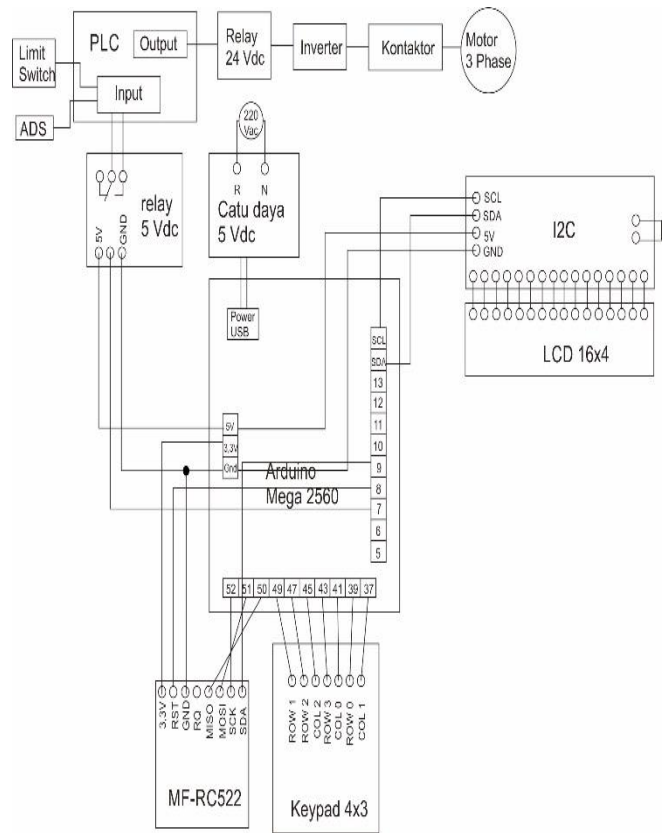


Figure 3.2 Circuit of tools

**3.3 Flowchart**

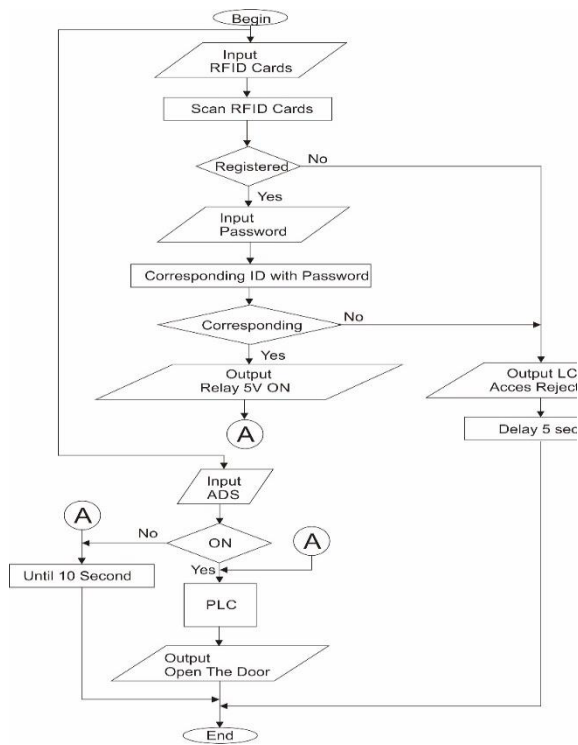


Figure 3.3 Flowchart

RFID	ID Number	Registered	True Password
RFID 1	632082054111	Yes	1111
RFID 2	14916016840181	Yes	2222
RFID 3	101193143403	Yes	3333
RFID 4	158202633275	Yes	4444
RFID 5	158152273261	Yes	5555
RFID 6	95194740178	No	
RFID 7	14113720145224	No	

Table 2. Result of RFID and password to open the door

RFID	Password Input	Access	ADS ON	Door
RFID 1	1234	Rejected	Before 10s	Close
RFID 2	2222	Received	Before 10s	Open
RFID 3	3333	Received	Before 10s	Open
RFID 4	1582	Rejected	Before 10s	Close
RFID 5	5555	Received	After 10 s	Close
RFID 6	5454	Rejected	Before 10s	Close
RFID 7	1411	Rejected	Before 10s	Close

**3.4 Test of Result**

**3.4.1 Initial LCD Display**



Figure 3.4 Initial LCD Display



Figure 3.5 RFID card is registered and entry password

**3.4.2 RFID and The Password**

Table 1. ID number of RFID cards and password is used

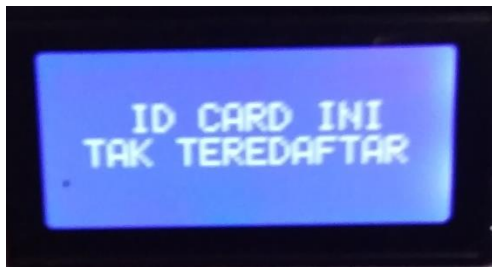


Figure 3.6 RFID card is not registered



Image 3.7 The Password is true



Figure 3.4 The Password is false

#### IV. CLOSING

##### 4.1 Conclusion

1. The door will open after scanning the registered RFID card and entering the password according to the RFID card used. And the auto door sensor is active before 10 seconds, calculated from when entering the RFID password correctly.
2. The door will remain closed even though it has scanned and entered the password correctly, because the auto door sensor is not active in 10 seconds from the time of entering the password correctly. To reopen the door, it is necessary to scan and enter the password correctly again.

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