Development of Electronic Parking System using RFID

(*Radio Frequency Identification*) Technology in UMS Area

Submitted as a Partial Fulfillment of the Requirements

For Getting Bachelor Degree of Faculty of Communication and Informatics in the study program of informatics

Written by:

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UNIVERSITAS MUHAMMADIYAH SURAKARTA

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APPROVAL

FINAL PROJECT

DEVELOPMENT OF ELECTRONIC PARKING SYSTEM USING RFID (*RADIO FREQUENCY IDENTIFACATION*) TECHNOLOGY IN UMS AREA

Has been reviewed and approve at:

Day : Rabu

Date : 16 Juli 2014.

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APPLICATION OF RFID FOR SECURING COMPUTER LABORATORY INVENTORY Paper

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DEVELOPMENT OF ELECTRONIC PARKING SYSTEM USING RFID (RADIO FREQUENCY IDENTIFICATION) TECHNOLOGY IN UMS AREA

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Currently, there are many identification using RFID (Radio Frequency Identification) technology, the application of this technology has helped many people to work. One application of RFID is an automatic parking system. It can be used for parking access in and out automatically which can help users to access in and out of parking at UMS. In UMS which is currently still using the parking system where each user manually out of the parking area, then the user will show as a vehicle registration validation, with such a way that would make any long queue again at rush hour. With this system, it is necessary to allow the solution to solve problems, such as the use of RFID technology. The author use Passive RFID, the maximum range with the RFID tag is about 5cm-10cm, communication speed 106Kbit/s, frequency 125 KHz, plug and play system, and support operating system windows 95/98/200/XP/windows 7/Linux and windows 8. The purpose of this research is to improve the effectiveness, efficiency and security in UMS, because each user will be given a card and the card contains a user's data access in and out of parking to the parking area UMS. These studies used several methods such as direct interviews with park guards, reading literature and get a needs analysis helps researchers to make program management applications. The result of this study is a desktop application for a microcontroller and a web-based information system to access data and reports parking that can help users to see the data and can see the parking lot parking reports each month and can create a policy to build more parking space again and also allows users to access and out of the parking lot which is no longer automatically using registration for access in and out of parking, but parking UMS user is given a card containing a parking user data, and is no longer using the vehicle registration for access in and out.

Keyword: RFID Tag, RFID Application

1. INTRODUCTION

Today, Technology develops very quickly along with the need of human that want easiness, rapidity, and accurate information, especially in identification This technology is called *Radio Frequency Identification* (RFID).

Actually, technology of RFID has been existed since some years ago even some people say that it has been since 1940s. Then, in 1970, this technology was opened for general. Meanwhile, the production of this technology has been started since 1999. The leader of this technology is Texas Instrument, Philips, Sony, and Intermec. In Asia, this technology has been popular since 2005. Now, RFID using becomes popular in Indonesia.

There are many advantages of this system. For instance, it used to security of parking, security of office inventory, even it is used only for employee attendance. RFID system consisted of three basic component, *tag* or *transponder*, *reader*, and *database*. *Tag* RFID is the object labeling tools that has object data. The next is *reader* RFID. It is used as *scanning* tool or information reader tool for reading the information that is in the *tag* RFID itself. The last is *database*, used as tracker and saver for some objects information that is had by *tag* RFID.

Actually, RFID itself was developed from previous identification system, which is *Barcode*. The basic differences between RFID and *barcode* are on scanning system, they are transponder reader or labeling tool. For *barcode*, the process usually is done and using the right position of *tag* and *reader*. If it is not, tag cannot be read by reader. It is the different with RFID system. Where, by only put the RFID close to the reader, the card can be identified.

Parking system in UMS still uses manual system that is the motorcycle or car owner presents *Vehicle Registration Certificate* to the security

one by one when they want to go out form UMS parking area. This process spends many times so that it affects the long queue in exit door, especially for busy time. The other bed effects of this way are the students often forget to resave their *Vehicle Registration Certificate* so that they often lose their *Vehicle Registration Certificate*. Fortunately, these problems can be solved by using RFID technology.

In this case, every student or lecturers who want to park in UMS parking area are given RFID tag or *contactless smart card* (CSC) that it has the user information. This card is used to open the exit door. The advantages of using this system are, 1) parking managing will be easier and more quickly, 2) enter and exit data will be more accurate, 3) getting user information easily then it can be done by statistic as the consideration in deciding the policy.

In this time, there are many *auto* identification technologies but RFID (*Radio Frequency Identification*) technology is the cheapest technology from *auto* identification to spread out the information easily and accurately. The application of RFID technology that will be used by the writer for applying this system in UMS parking system so that it will make the identification of vehicles easily.

2. FUNDAMENTAL THEORY

RFID is an electromagnetic communication technology which is used for identifying or tracking of specific objects, such as inanimate objects, pets or animals and even humans. According to Winda (2009:3), the main components of RFID are tag, reader, antenna and software.

In RFID system, it is needed a *reader* or *scanning-device* tool that can read *tag* well. *Reader* is often called as *interrogator*. This *Reader* has some antennas that the function is transferring and receiving data from *tag* to *tag*. In this study, it uses RFID type ID 12 that is working in 125-134

KHz with short distance, about 2 cm (*Low Frequency*).

1. RFID Tag

   RFID tag is a component made from microchip and an antenna that are connected, the shape of this tag is variation, however its structure is made in flexible shape so that it can be set on the object of the target.

   a. Active Tag

      Active tag is used in big asset like cargo contents that is needed long distance tracker. This tag is usually operated in tag 455 MHz, 2.45 GHz or 5.8 GHz and has distance reading ability from 60 into 300 khaki (20 m – 100 m).

   b. Passive Tag

      Passive RFID has no power resource and radiator. Its price is cheaper than active tag and it need not gradual treatment. Because of that, it is usually used in little factory. This passive tag has shorter distance of reader capability than active tag. (About less than 1 cm to 1m).

2. RFID Reader

   It is consists of reader and antenna that will affect the optimal range of identification. RFID reader will read the stored information inside the tag via radio frequency. The function of the antenna is a signal amplifier that sent it signal to the tag and read it back to processing. RFID reader connected directly to the host computer system.

Table 1 Frequency of RFID Reader

Frequency Type	Frequency Range	Frequency Uses	Range Distance
Low Frequency	30 KHz to 300KHz	125-134 KHz	Less than 0.5 m
High Frequency	3 MHz to 30 MHz	13.56 MHz	Up to 1.5 m
Ultra High Frequency	300 MHz to 3 GHz	800-900's MHz	865- 956MHz (5m)
Microwave	2-30 GHz	2,45 GHz	Up to 10 m

3. METHOD

A. PLOT OF RESEARCH

The design of this automatic parking system through several stages and processes. This is done in order to produce a good research and according to the purpose of the research itself. Research using the method of Research Development in conducting research. Research Development of research methods that are used to produce a particular product, and test the effectiveness of these products.

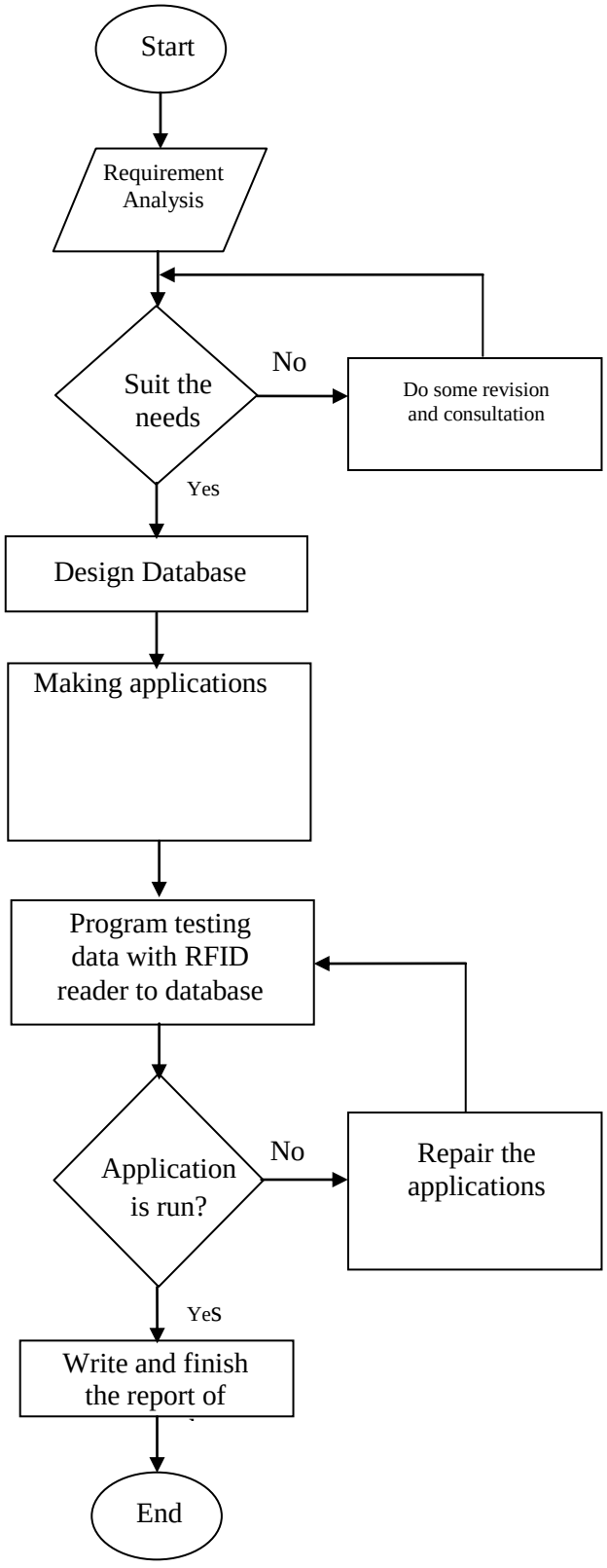
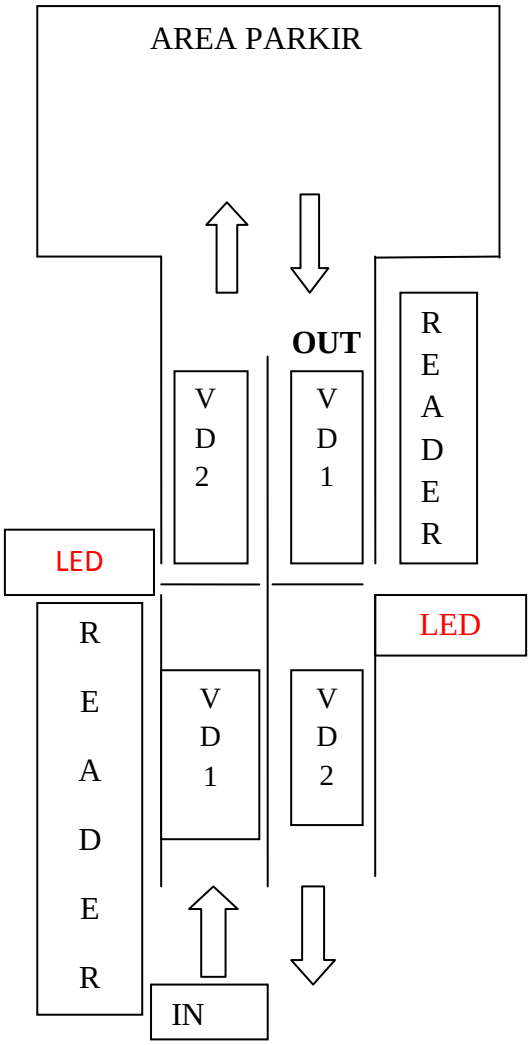


Figure 1 Research Flowchart

B. Prototype Automatic Parking System



VD = Vehicles Detector

The initial step for detecting a vehicle when the vehicle is entering in through the entrance and vehicles first detector detects the vehicle, then displayed a message "Silahkan Tempelkan Kartu". After the user pressed the card, and the card is valid, the gate is open or the LED is green and the message "Silahkan Masuk" after the message appears, the user enters into the parking area and the two vehicles to the detector will detect that the vehicle had been entered into in the parking area then the gate will close again automatically

Then when the user wants to get out of the parking lot, vehicles first detector will detect the presence of vehicles that will come out, after that it will display a message "Silahkan Tempelkan Kartu" if it is valid, then a message will pop back "Selamat Jalan, Terima Kasih," and the gates will open, then the driver will get out of the parking area, and a second detector detects the presence of vehicles exit the vehicle, exit the vehicle after the gate is closed automatically.

C. The Flow of Vehicles In

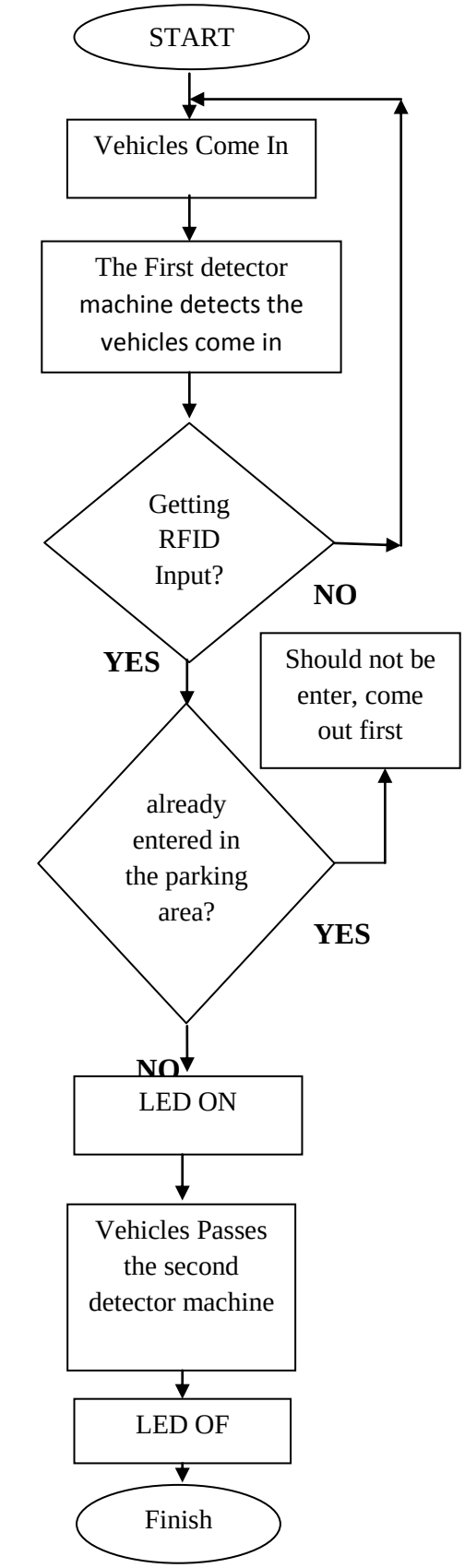


Figure 2. Entering Vehicles

D. The Flow of Vehicles Out

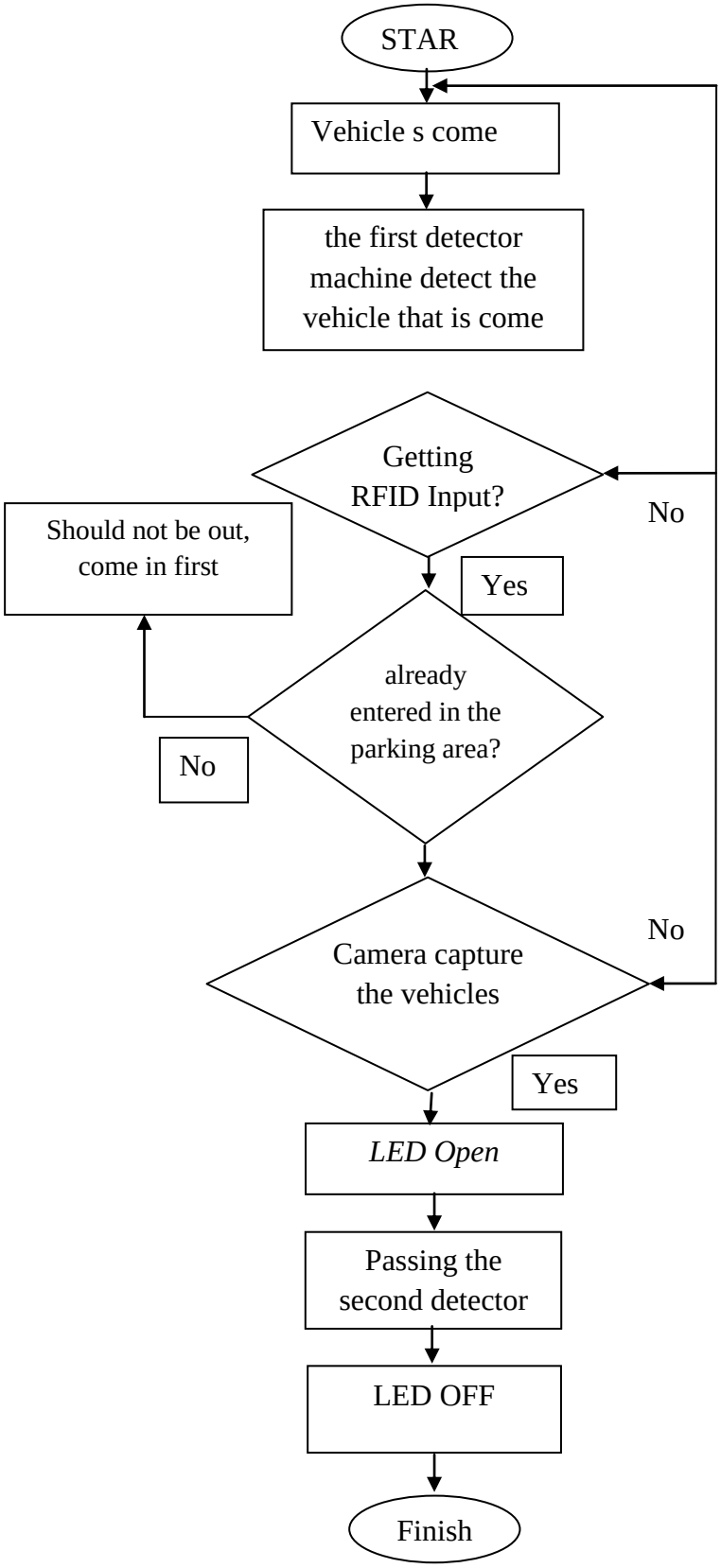


Figure 3. Exiting Vehicles

4. RESULT AND DISCUSSION

4.1 Program Testing

Program testing internally to determine the application program that has been created is good or not is using black box testing. This method can find error in the function of the program, error in data structure and error in accessing the database.

a. Entry Parking

Testing for form entry parking using black box table is displayed on Table 2.

Table 2. Entry Parking

NO.	Function	Status
1	RFID Reader In	GOOD
2	Vehicles Detector 1	GOOD
3	LED/GATE	GOOD
4	Vehicles Detector 2	GOOD
5	TAG	GOOD
6	CAMERA	GOOD

b. Exiting Parking

Testing for form out parking using black box table is displayed on Table 3.

Table 3. Out parking

NO.	Function	Status
1	RFID Reader Out	GOOD
2	Vehicles Detector 1	GOOD
3	LED/GATE	GOOD
4	Vehicles Detector 2	GOOD
5	TAG	GOOD
6	CAMERA	GOOD

c. Program Testing For Login Web-Base.

Testing for form web-base using black box table is displayed on Table 4.

Table 4. Form Login

NO.	Function	Status
1	Login administrator	GOOD
2	Login as admin	GOOD

d. Home Table

Home table is displayed after user login successfully. Testing for home page form using black box table display on table 5.

Table 5 Home Table

NO	Function	Status
1	Menu	GOOD
2	Input Data	GOOD
3	Data Anggota Parkir	GOOD
4	Laporan Data Parkir	GOOD
5	Contact Us	GOOD
6	Log Out	GOOD

e. Form Member Data Parking.

This form is displayed after administrator select menu "Data Anggota Parkir". Testing for form "pencarian anggota" using black box table is displayed on Table 6.

Table 6 Form Members

NO	Function	Status
1	Pencarian Data Anggota	GOOD
2	Cari Button	GOOD

f. Form Members

This form is displayed after administrator select menu "Input Data Parkir". Testing for form input data parkir using black box table is displayed on Table 7.

Table 7 Form Members

NO	Function	Status
1	Tab no mahasiswa	GOOD
2	Tab nama mahasiswa	GOOD
3	Tab no ktp/nim	GOOD
4	Tab id_kat_ anggota	GOOD
5	Tab of jenis kelamin	GOOD
6	Tab of Fakultas	GOOD

g. Form Parking Data Report.

This form is displayed after administrator select menu "Laporan Data Parkir". Testing for form "Laporan Data Parkir" using black box table is displayed on Table 8.

Table 8 Form Data Report

NO	Function	Status
1	Laporan By Bulan	GOOD
2	Laporan By Tahun	GOOD
3	Laporan By Fakultas	GOOD

4.2 Analysis of Research

In the design of automated parking systems with RFID, the author encountered some obstacles that affect the results and performance of the system. There are some advantages and a disadvantage of this system compared with the previous parking system is still manual. That is to say the manual is a parking system that every user wants to get out of the park when the parking area, then the user must show vehicle registration.

1. Advantage

Automated parking system is implementing RFID as a vehicle detection device, in this study the object in question is a member of a motorcycle or a car and parking. Where each member of the parking will be provided a vehicle registration card that serves as a substitute for access in and out of the parking area UMS. The card contains a data, such as vehicle numbers, user names, faculties and departments of the vehicle users. The advantages of this system include

a. To access the parking area exit no longer need to show vehicle registration as vehicles of identity, but has been replaced with a tag or RFID card.
b. Data park exit or entrance can be seen on the web-based information system.
c. Parking attendants made easier with this automated parking system, because it does not need to check one by one vehicle registration out.
d. Parking attendants can print the results of its monthly parking report to see an increase in user graphs parking at UMS.

2. Disadvantages

In addition to the above advantages, this system also has shortcomings, that is:

a. RFID is used in this study only uses passive RFID, so do not read distance away, so the user must attach the card to a distance of 5-10 cm.
b. This system is only focused on RFID functionality to detect, the data, so there are many functions that have not been optimized as security for application programs and display applications.
c. RFID technology is a technology that is still hard to find on the open market. To get this RFID had to go through the booking out of town.

5. CONCLUSION

The author said that with the complete of this research, the author has been achieved the expected goal of the research. To easily and more efficiently provided to users for access in and out of parking by using RFID technology which is simpler and more accurate. Also about providing a clearer data and arranged so that administrators know about the average user can make a parking lot and to the institution or university policy to build more parking space outside.

DAFTAR PUSTAKA

Maryono. 2005. ”Dasar-dasar Radio Frequency Identification (RFID), Teknologi yang Berpengaruh Di Perpustakaan”. Media Informasi Vol XIV No.20, p.18-19

(http://elib.unikom.ac.id/files/disk1/394/jbptunikompp-gdl-rahmansana-19676-2-babi.pdf) accessed October 2013.

(http://salamwisata.blogspot.com/2012/02/sejarah-rfid-radio-frequency.html), accessed October 2013.

(http://electronics.howstuffworks.com/gadgets/high-tech-gadgets/rfid.htm) accessed June 2014.

Saputra,Fahdly H. “*Sistem Absensi Menggunakan Teknologi RFID.”* Penelitian Jurusan *Radio frequency identification for item management-unique identification for RF tags*, 2008-06-24.

Habsyah Velayati, Yuli Christyono and Imam Santoso. “*Aplikasi Sistem Parkir Dengan Automatisasi Pembiayaan Berbasis RFID (Radio Frequency Identification)* Penelitian Jurusan Teknik Elektro, Fakultas teknik, Universitas Diponegoro, Semarang..

Eridani,Dania. Yuli Christiyono. dan Imam Santoso. “*Simulasi Gerbang Tol Menggunakan RFID (Radio Frequency Identification):* Jurusan Teknik Elektro, Fakultas Teknik, Universitas Diponegoro, Semarang. 2-8.

Anthadi P, Arief. Wahyul Amien S and Darjat. “*Pemanfaatan Teknologi RFID Untuk Sistem Multi Akses Mahasiswa:* Penelitian Jurusan Teknik Elektro, Universitas Diponegoro, Semarang. 2-5.

Prasetyo,Andi, Setiawardhana dan Ardilla Fernando.*Aplikasi Transaksi Voucher Menggunakan RFID dan Fingerprint*, Institut Teknologi Sepuluh Nopember, Surabaya,Januari 2011

(http://www.computerhope.com/jargon/p/paraport.htm) access may 2014.

http://www.ct.gov/dot/lib/dot/Documents/dpublications/Vehicle_Detection.pdf