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:

Rizky Kurniawan

L200102012

THE DEPARTMENT OF INFORMATICS

THE FACULTY OF COMMUNICATION AND INFORMATICS ENGINEERING

UNIVERSITAS MUHAMMADIYAH SURAKARTA

2014

APPROVAL

FINAL PROJECT ENTITLED

DEVELOPMENT OF ELECTRONIC PARKING SYSTEM

USING RFID (RADIO FREQUENCY IDENTIFACATION)

TECHNOLOGY IN UMS AREA

Has been reviewed and approved at:

Day : Pabu

16 Juli 2014.

Advisor I

Advisor II

<u>Gunawan Ariyanto Ph.D.</u>

NIK:

Agus Ulinuha, S.T., M.T., Ph.D

NIK: 656

ACCEPTANCE

DEVELOPMENT OF ELECTRONIC PARKING SYSTEM USING RFID (RADIO FREQUENCY IDENTIFACATION)

TECHNOLOGY IN UMS AREA

Present by

RIZKY KURNIAWAN

L200102012

Has been examined by the board of examiners and approved as a partial fulfillment of the requirements for getting Bachelor Degree

on Raby. 16 Juli 2014.

Team of Examiners

This final project report has been accepted as one of the requirements for getting a bachelor degree

Advisor I

Advisor II

(Gunawan Ariyanto Ph.D.)

(Agus Ulinuha, S.T., M.T., Ph.D)

Examiner I

(Dedi Ary Prasetya S.T

This final project report has been accepted as one of the requirements

for getting a bachelor degree

Dean of

Faculty of Communications and Informatics

Head of

Department of Informatics

Husni Thamrin, S.T., M.T., Ph.D

NIK: 706

Dr. Heru Supriyono, M.Sc.

NIK: 970

LIST OF CONTRIBUTION

Me as the author and also program developer declares that this research does not use the work of other people that had been proposed before to get their bachelor degree in a university and as long as I know, there is no the work or opinion of other people that had been published, except the written references on this paper and it is mentioned at list of references.

Following is the list of contribution that is declared by the author of the research arrangement:

- The author analyzes the system parking electronic using RFID in UMS area with directly interview method and discussion with Mr. Agus Ulinuha, Mr Gunawan Ariyanto and Mr. Sapto Hari Wibowo.
- Learn and discuss about RFID technology with Mr. Sapto Hari Wibowo, Mr. Irwan Prasetyo and Mr. Harits Subhan.
- 3. Designing of information system by myself with many helps of Mr. Agus Ulinuha, S.T., M.T., Ph.D. as my supervisor, Mr. Sapto Hari Wibowo, Mr. Muhammad Dawud, Mr. Wakhid Wicaksono for their opinion and also referring to some books and website that is attached on list of reference.
- 4. The author creates this system with a laptop, Xampp as the database provider, uses PHPMyadmin for information system in website and using Visual Basic for program microcontroller.

This, the declaration or statement and list of contribution is created actually and honestly. The author takes the responsible for content and the truth of

> Surakarta Juny 2014

> > Rizky Kurniawan

Ascertain,

Advisor I

Advisor II

Gunawan Ariyanto Ph.D NIK:

Agus Ulinuha, S.T., M.T., Ph.D

NIK: 656

MOTTO

"There is no turning back, whatever happens to be faced"

"Successful needs a process it takes hard work success without hard work success is only as a dream"

"Everyone in this world will be a success, but each person will be different to his success, depending on how they are trying to get that success"

DEDICATION

- 1. Alhamdulillahirabbil'alamin, the first word that the author said, because the mercy and blessing from Allah SWT, the author may complete this research.
- 2. My beloved parent, Suherman and Yusmanita that always give their prayer to me, also mentally and material support. Thank you very much for your love and anything that you give to me, may Allah always love you too.
- 3. All my family that always give their supports and advices to me.
- 4. Kiki Meiyana that always gives me mentally supports and motivation to complete this research.
- 5. All of lecturers of Department of Informatics Engineering, Faculty of Communication and Informatics, Muhammadiyah University of Surakarta.
- All friend of my home stay, all friends of Informatics Engineering class 2010, especially international class. Thank you for your supports.
- 7. All partners that cannot be mentioned one by one.

PREFACE

Assalamu'alaikum, Wr. Wb.

Allhamdulillahirobbil'alamin, we pray that Allah SWT has bestowed His grace and guidance so that I can finish this thesis with the title "Development of the Electronic Parking System Using RFID (Radio Frequency Identification)

Technology in UMS Area".

This thesis is structured to meet the curriculum in Informatics Engineering Program, University of Muhammadiyah Surakarta, as student obligations in order to complete the degree program.

The author realizes that this thesis is still far from perfection, therefore criticism constructive suggestions from various stakeholders is the author hoped for the sake of future improvements.

The realization of this thesis cannot be separated from the support of various parties. Therefore, in this moment I wish to thank you profusely for:

- Allah SWT who has given us the mercy and blessing until author can complete the research and report arrangement.
- 2. My beloved parent and family who always give me their prayer, spirit, support and motivation while I do the research and arrange the report.
 - Mr. Husni Thamrin, S.T, MT., Ph.D. as Dean of the Faculty of Communication and Information University Muhammadiayah Surakarta
 Mr. Husni Thamrin, S.T, MT., Ph.D. as Dean of the Faculty of Communication and Information University Muhammadiayah Surakarta.

2. Mr. Heru Supriyono, S.T., M.Eng.Sc., Ph.D. as Head of Department of

Informatics Engineering.

3. Mr. Gunawan Ariyanto Ph.D. as academic mentors who have provided

supplies knowledge, direction, guidance and motivation advice for writers

studying at the Faculty of Informatics Community and UMS.

4. Mr. Agus Ulinuha, ST, MT, Ph.D. as academic mentors and tutors II

during college that has provided, guidance and direction to the author so as

to finish this thesis.

5. Mr. Sapta Hari Wibawa S. for his time, guidance and experiences in RFID

technology.

6. All friends of Department of Informatics Engineering class 2010

especially international program for your motivation and support.

Finally, the author realizes that this research or thesis and its report is not

perfect. Therefore, the author hope to the reader gives the good critics and

suggestions. The author hopes this report useful for himself and can increase the

knowledge of reader.

Wassalamu'alaikum. Wr. Wb.

Surakarta, July 2014

Author

ix

LIST OF CONTENT

TITLE	i
APPROVA	L ii
ACCEPTA	NCE iii
LIST OF C	CONTRIBUTIONiv
MOTTO	vi
DEDICAT	IONvii
PREFACE	viii
LIST OF C	CONTENTx
LIST OF T	ABLE xii
LIST OF F	TGURE xiii
CHAPTER	I INTRODUCTION 1
A.	Background of Research
B.	Problem Description
C.	Scope of Study
D.	The Aim of Study
E.	The Benefit of Study
F.	Report Structure
CHAPTER	RII LITERATUR
A.	Study of Research
B.	Fundamental Theory
CHAPTER	Z III METHOD OF RESEARCH
A.	Time and Date Study
B.	Main Equipment and Support
C.	Plot of Research
D.	Design
	1. Method of Data Collection26
	2. Design Application Program27

3. Prototype Automatic Parking System28
4. Designing Report Writing System29
5. Making an Application Program29
6. TIC (Table Instance Chart29
E. ERD (Entity Relationship Diagram)34
F. Identification of Vehicles using RFID Reader EM4001 34
G. Identification of Vehicles using RFID36
CHAPTER IV RESULT AND ANALYSIS
A. Implementation Parking System
1. Computer Hardware & Network
2. Interface Database (VB)
B. Result of Program Testing60
C. Information System Program63
D. Analysis of Research72
CHAPTER V CLOSURE
A. Conclusion
B. Suggestion
REFFERENCES
I AMPIRAN

LIST OF TABLE

Table 2.1. Active tag	. 10
Table 2.2. Comparison of RFID	. 13
Table 2.3 Functional capability of active and Passive RFID	.16
Table 3.1. Table of Faculty	. 30
Table 3.2. Table of Members	. 30
Table 3.3. Table of Gate	. 31
Table 3.4. Table of Department	. 32
Table 3.5. Table of Parking	. 32
Table 3.6 Table of category members	. 33
Table 3.7 Table of User	. 33
Table 4.1 Entry Parking	60
Table 4.2 Exiting Parking	60
Table 4.3 Log in Form Testing	61
Table 4.4 Home menu testing	61
Table 4.5 Input Data parking Testing	62
Table 4.6 Form member Data parking	62
Table 4.7 Form Parking Data Report	. 63

LIST OF FIGURE

Figure 2.1 RFID Active Tag	10
Figure 2.2 Reader Block diagram	18
Figure 2.3 Port Parallel	20
Figure 3.1 Flowchart of Research	25
Figure 3.2 Design Database	34
Figure 3.3 Flowchart Entering Vehicles	37
Figure 3.4 Flowchart Exiting Vehicles	38
Figure 3.5 Mini Prototype	39
Figure 4.1 USB RFID Reader	40
Figure 4.2 Tag RFID	41
Figure 4.3 Limit Switch	42
Figure 4.4 LED	42
Figure 4.5 Switch Hub	43
Figure 4.6 Connection to PC Entry	44
Figure 4.7 Connection To PC server	44
Figure 4.8Connection Successful	45
Figure 4.9 Display on PC park Entrance	45
Figure 4.10 Prototype parking area	46
Figure 4.11 Vehicle Entry	46
Figure 4.12 Display on Monitor	47
Figure 4.13 reader detects the tag	47
Figure 4.14 Display on PC	48
Figure 4.15 vehicle detector two detects a vehicles	48
Figure 4.16 Display on monitor after trough the vehicles detector two	49
Figure 4.17 reader detects an invalid tag	49
Figure 4.18 Display on monitor an invalid tag	50
Figure 4.19 Display on web-based	50
Figure 4.20 Entries parking without vehicles	50
Figure 4.21Display on monitor	51

Figure 4.22 Entry the vehicles	51
Figure 4.23 Entry the vehicles and attach to the card in the reader	52
Figure 4.24 Display on monitor entry parking	52
Figure 4.25 parking out connection on PC	53
Figure 4.26 connect to PC server	53
Figure 4.27Connection Successful	54
Figure 4.28 display on pc out parking system	54
Figure 4.29 Prototype Parking area	55
Figure 4.30 vehicles out of parking	55
Figure 4.31 Display on Monitor	56
Figure 4.32 Reader detects the tag	56
Figure 4.33 Display on PC	57
Figure 4.34 Vehicles detects 2 detect a vehicles	58
Figure 4.35 display on monitor after vehicles trough the vd 2	58
Figure 4.36 reader detects an invalid tag	59
Figure 4.37 display on monitor an invalid tag	59
Figure 4.38 Log in	64
Figure 4.39 Main menu	64
Figure 4.40 Home	65
Figure 4.41 Page input data parking	65
Figure 4.42 Page of data members	66
Figure 4.43 parking data report	66
Figure 4.44 page report of parking per month	67
Figure 4.45 the report incoming outgoing vehicles per year	67
Figure 4.46 Report annual parking	68
Figure 4.47 user display parking per years	68
Figure 4.48 Report of parking per faculty	69
Figure 4.49 User Display parking	69
Figure 4.50 about page	70
Figure 4.51 administrator	70
Figure 4.52 data user can be deleting or edit	71

Figure 4.53 User	71
Figure 4.54 Graphic Data Statistic	72

ABSTRACT

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.