The Development of Motorcycle Parking System Based on RFID and Visual Basic Database

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The Development of Motorcycle Parking System Based on RFID and Visual Basic Database

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Abstract

This research developed a motorcycle parking system based on RFID supported by Visual Basic database. First step, developed an open-close system of motorcycle portal and a database of RFID Card user. Second, the system encoded all of registered visitor who pay retribution every semester. The other (temporary)visitor, have to pay retribution when enter parking area. Card substitutes the manual system which was served by officer. The on-off controller of DC motor-driver was used for open-close of portal. Portal was equipped with RFID Box. The portal will be opened after the Card is moved closer to Reader. The maximum distance between Card and Reader is 7 cm. The unique code of Card will be identified by Reader. The unique code of Card is according to Card owner identity and function as a trigger to open portal. The Portal automatically closed after microcontroller receives a signal from PIR sensor. Motorcycles which passed portal were detected by PIR sensor. Identification of incoming and outgoing visitor, were encoded in the database. Testing sample 200; 160 Card owners registered as customer and the other 40 cards used for visitors who have to pay retribution. Parking model can be applied in any parking area.
Key words: RFID, Visual Basic, on-off control, park-portal

1. INTRODUCTION

The research objective was to develop a parking system which could encode the visitors and parking area activities.

Parking as an area to place the motorcycle for temporarily time, vehicle which is left by the owner needs a secure condition. The visitor/vehicle owner who have activities in surroundings of the parking area entrust their vehicle toward security officer. Visitors get a piece of parking paper/receipt after they have paid a retribution fee. Parking paper as parking ticket is not friendly with environment, if it's not properly handled after use it. A parking ticketing system should be equipped with encoding of visitors data and their activities. The related data were visitor ID, parking duration, number of visitor, vehicle data and soon. Parking system can be facilitated with information about availability of parking space and occupied space. Improvement of servicing in the parking area can be facilitated by modern technology. Visitors of parking area were serviced by open-close system of parking portal in order to overcome parking problems i.e.: (1)a jamming affected by queuing when the visitors enter to the parking area,(2)Payment of parking retribution fee were not monitored and were not traced, (3) motorcycles ID number and the name of owners were not recorded, (4) difficulties to trace of parking area visitors for detecting of stealing, (5)the five problems can be improved by currently developing technology. Queuing condition happened because of parking ticket hands over together with payment of retribution fee. Retribution payment for visitor who haven't parking ticket yet, need more than 1 minute especially when the security officer have to return the change. Delivering of ticket which is has a card-form and a piece of paper as

a receipt of retribution fee. A queuing the motor in front of parking portal so will cause a jamming at around parking gate area. We have to pay attention with possibility of visitors will late to perform their activities. These problems in a parking area can be solved by developing a parking system; (1) automation of open-close parking portal based on incoming and outgoing activities. (2) ID card as substitution of parking paper will read automatically by system, (3) classification of card as registered card and as not-registered card which have a relation with retribution fee. (4) The amount of identified card will be stored in the database and the data can read/printed at any time.

This research objective was to make a parking system by encoding the visitors as a buyer of Registered Card or temporary visitor. Visitor ID cards contain unique code named as RFID (Radio Frequency Identification) Card. ID card can be read by RFID reader which connected to microcontroller. Microcontroller transmits a signal to motor-driver and portal will be opened. On the contrary, when PIR sensor detects motor cycle it will transmit signal to microcontroller so the portal will be closed. System target was to detect the sample 200 RFID Tags on the open-closed processes parking portal. From the total 200 RFID tags, 80% of them were as registered ID card and 20% of them were as temporary card.

2. THEORY

Higher Education institution execute education processes, their financial management based on fairness principle, efficiency, transparency and public accountability according to chapter of 48, point (1) Law No. 20 Year 2003 about National Education System. The reference of Higher Education activities execution is effort in such a way so will be created conducive situation between employee and educational supporter officer, as well as lecturer. The conducive situation is intended for serve the students as customer of Higher Education and as the nation next generation who will continue the nation development based on their profession. The parking servicing was equipped with camera as parking information system is more efficient. [Zul Bahrum C. 2007]. Parking mode by detecting a face (camera) can be applied for registered or temporary visitor. Temporary visitor of parking area is not recognized by system, so need a solution.

Motorcycle parking technology RFID based, improve the camera system [Hamid 2010]. Someone who will enter parking area is given parking card (RFID Tag). The system detects unique code in the Tag which is moved closer to RFID Reader Box, so will be recorded the time of incoming/arrival to the parking area. RFID readers which have connected with computer which is able encode using of RFID Tag which is given to user of parking area. Computerized

Parking system using RFID technology with RFID Input Tag which is read when enters to parking area. Output which displayed as parking retribution fee counted when goes out then recorded in the parking finance income report. The quantity of RFID Tag user can be displayed the seventh segment [Thiang. 2009],show the left slot on the block of parking area.

2.1 Parking Slot

Availability Information Slave microcontroller responds a signal from reading result of sensor, the data of

sensor was responded and obtained a data of amount parking slot is still available. The data can be displayed to the 7 segment [Thiang 2009] inspection is there a data request from the master microcontroller. If no data request from the master microcontroller, so the slave microcontroller will read again the sensor, such as way continuously the processes executed repeatedly. The availability information of parking slot is very help for smoothing the parking process and credibility/performance of parking organizer will put to a test. Visitor would satisfy and comfortable to use parking area.

2.2 Parking Servicing and Servicing Innovation The intelligent car parking management system based on a wireless sensor network was described [Vanessa W.S. Tang. 2006]. Analyzed the requirements of real car park management systems proposed the main system function and designed the system architecture. A prototype system was realized the designed functions using the crossbow products of motes as implementation. The wireless sensor networks into a real car park to test, its analysis performance and perform on the optimization of the algorithm and strategy.

Parking servicing which equipped with camera as parking Information System(IS) was more efficient [Zul Bahrum C. 2007].Parking applications using information system was better, faster, orderly and more reliable of securing. Photograph verification of the vehicle owner who used the camera better than manual system. Orderly and secure compare with manual method, according to respondent opinion (73%), Secure parking is a main key and prioritized by respondent (motorcycle owner). Vehicle owner feels not convenience if parking area which used is unsafe and unsecure. The parking visitor restlessness needs to be eliminated, and need parking system which secure and orderly, freed from stealing. The parking must in order even though the parking area is limited.

The idea of secure and orderly parking system needed to develop for improving of campus servicing as educational organizer. Innovation of service is an interaction changing with customer [Mirnasari R.M. 2013] or a new method in servicing. Topology innovations pay attention in sector of product, process, method, and policy service system. Smart card include in the service system. Innovation servicing quality can be accessed from tangible, reliability, responsiveness, assurance and empathy.

2.3 The Parking System Hardware

The visitors of parking area was classified in two groups i.e.: registered visitors who have ID Cards, called ***Pedekapas*** (*Pengunjung Dengan Kartu Pas*) and the temporary visitors who doesn't have ID Cards, called ***Petekapas*** (*Pengunjung Tanpa Kartu Pas*). *Pedekapas* means visitors who have ID Card and pay retribution fee every six month, the other hand *Petekapas* means visitors who doesn't have ID Card, and they must pay retribution fee when enter to the parking area. Database system is designed for recording the parking retribution fee which is detected from using of *Pedekapas* and *Petekapas*. Two hundred RFID Tags(Figure 1a) will be identified their unique code which is stored in the card and must suitable with code identity of Parking Card.The other, cards were RFID Tag with

unique code but without identity, so can be used by temporary visitor who doesn't have ID Card. Both of card type are moved to the Card Reader (Figure 1b) in maximum distance 7 cm, expected 200 RFID Tag can be identified. RFID Tag Identified data were stored in the database which can be displayed in PDF format file or be printed out at any time.

Parking and payment receipt/card are simple designed and succeed the environment friendly program. The combining function of ID Cards as a presence tool with a parking payment receipt.

Parking ticket which identified from student/employee/lecturer ID Cards is very interested to be developed. Beside, this parking visitor data can be saved in Microsoft Excel file or PDF format file, only be printed out if necessary to support friendly environment (go green) program. Parking visitor will be recognized or identified by the system. Parking officer will ask retribution fee to the temporary visitor or not registered visitor who have not ID Cards or to the registered visitor but the ID Cards have already expired. Parking payment system in the campus (education institution) was done generally for certain period e.g. each semester/six months. All of parking activities can be designed integrated on Information Communication Technology (ICT). Related integration meant for instance that the Personal Head Department can monitor this parking system. Parking system is expected can raise service/convenience of parking visitor. Parking officer can read status of motorcycles owner in the PC (Personal Computer). Parking visitors were classified as registered visitor who have ***Pedekapas Card*** and as temporary visitor who doesn't have ID Card yet and have compulsory to pay retribution fee when enter to parking area and get ***Petekapas Card***.Hundred eighty RFID Tags will be identified its unique codes which were stored in the card and must suitable with card owner identities use as ***Pedekapas*** card. The other forty cardswere RFID Tags with unique codes but without identities use as ***Petekapas*** card so can be used by temporary visitor. Booth RFID Card types were moved closer to the RFID Box/Reader with maximum distance 7 cm, were expected

200 RFID Tags can be identified. The RFID Tag identified data will be saved in the database which can be displayed in PDF format file or can be printed out at any time.

(a) Passive Tag RFID

(b) RFID Box Reader

Figure 1 Tag RFID and Box RFID

2.4 Database System

Parking system is used every working day or holiday, during 24 hours, it is designed according following steps (Figure 2):

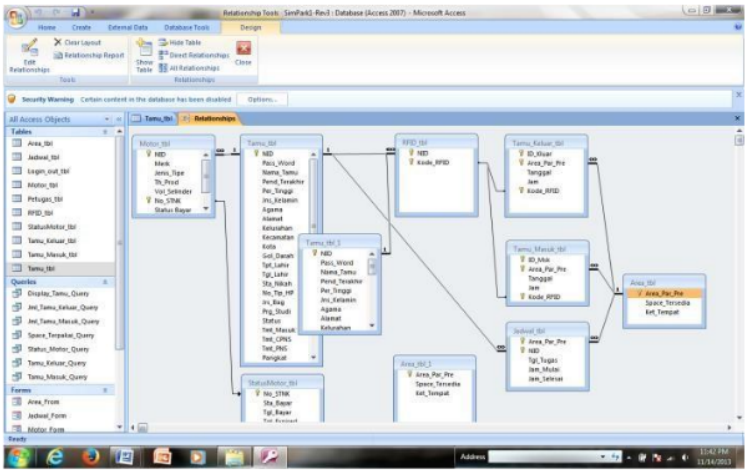

Figure 2 Design of Database System

Visitor moved closer the Pedekapas card to the RFID Reader in front of parking area main gate. Pedekapas card is detected valid and according with card owner data. A few second later the parking portal will open automatically. Motorcycle owner data will be displayed on the PC's monitor in front of parking officer.

- Parking visitor who doesn't have or doesn't bring

  Pedekapas card will be given Petekapas card by parking officer. Petekapas card is moved closer to the RFID Reader, it is detected valid as special code in the card.

  Payment of parking retribution fee by visitor is served by officer. Parking officer pushes Pay button, so parking portal will open. Payment data from the

motorcycle owner will appear on the screen and will be saved in the database.

- Pedekapas and Petekapas card which have been used for entering to the parking area, couldn't used for entering again. After the visitor is stated as out by the system, when the visitor bring his motorcycle out from the parking area, Pedekapas card will can be used for entering again.
- The system will record the amount of visitor who bring Pedekapas card, the amount Petekapas card and also encoded the amount of income from retribution fee every day.
- Pedekapas card user must touch the card to RFID Reader when go outside parking area. The card is detected and valid then portal will opened and motorcycle can leave the parking area.
- Petekapas user must shows the STNK (*Surat Tanda Nomor Kendaraan*), that is the paper which contain of motorcycle data i.e.: motorcycle number, owner's name etc. The officer press icon "Valid" then the portal will open.
- The data of Pedekapas and Petekapas card user will be recorded and saved in the system as long as desired and will be automatically deleted every six months.

Table 1 The research target with quality indicator

Servicing System		**Indicator**		
PHYSICALLY	RFID Tag-Box	Unique code in Card is read in PC	RFID Box Reader respondsif RFID Tag is moved closer	Every ID card number is displayed in PC
	Parking Portal	Raised 90°if any motor move closer to portal.	Comes down 90°acrossback after motorcycle coming in or going out.	Raised 90°if there is motorcycle approach the portal
	PC Displayingon Security Officer Table	ID Tag was displayed as PedekapasorPetakapas card.		
	Monitoring System on GFFHD's PC			

3. RESULT AND DISCUSSION

Parking system involves the motor owner, security officer as supervisor of parking area, the General Affair & Finance Head Department (GFFHD) or system responsible person, an administrator who manage smoothness of parking system. Parking system testing was done in the PNJ campus and then the system can be applied to the other places which need this system. The system was tested for verifying its reliability. The research target with quality indicator of servicing system (Table 1)

(a) Login Activity Screen

(b) Application Main Menu

(c) Parking Mode Monitor (Empty)

(d) Parking Mode Monitor (Filled)

Figure 3 SIMPARK Menu Display

As an effort to obtained reliable system so need to be done a testing toward designs which already made either hardware and software i.e.: First. A testing the database design is done with one as an example with Querying. Second, two sub-unit of parking system that are hardware and software, hardware be activated using software or vice versa. Third, operational testing consists of operational testing like scanning data, saving data, information about parking space, determine of parking time. Fourth, perfection of connectivity between hardware and software guarantee system integrity.

4. CONCLUSION

Parking information system which supported by visual basic database able to record the visitor, motorcycle and retribution data. The system which equipped with RFID card as parking card enable the incoming and outgoing of motorcycle process can happen smoothly and faster because of vehicle detecting using RFID card by RFID Reader went on in a short time. By using RFID card can reduce paper consumption and also reduce garbage production so can support the government program in creating friendly and healthy environment.

By classified the visitor in two groups i.e.: registered visitor and temporary visitor, so can be forecasted the potency of retribution fee which can be obtained every month.

5. AKNOWLEDGEMENT

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6. REFERENCES

[1] B. Hoh, et al. 2008. Virtual Trip Lines for Distributed Privacy Preserving Traffic Monitoring.. Proceeding of the 6th International Conference on Mobile Systems (MobiSys), pp. 15–28

[2] Hamid. 2010. The Development Computerized Parking System with Cost Automation and Using of RFID as User Unique Identity. *National Seminar of Applied Information Technology 2010 (SNATI 2010,* hal: F72-F8, ISSN: 1907-5022

[3] Mirnasari, R. M. 2013. Innovationof Public Servicing inUPTD Terminal Purbaya-Bungur Asih. Policy and Public Management. Vol.1, no.1, ISBN 2303-341X, hal. 71-84

[4] Thiang, Handry Khoswanto, Dimas Sutanto. 2009. Information Display System of Microcontroller based Car Parking. *National Seminar Computer Science and Its Application – SNIKA 2009 (26/11/2009)*, hal: A1-A6, *ISSN 1907-882X* Institute of Transportation Engineering Washington DC.

[5] Vanessa W.S. Tang, Yuan Zheng, Jiannong Cao. 2006. An Intelligent Car Park Management System based on Wireless Sensor Networks Internet and Mobile Computing Lab. Department of Computing The Hong Kong Polytechnic University, P.R. China. Proceeding of the First International Symposium on Pervasive Computing and Applications, pp. 65-70.

[6] Zul Bahrum C. 2007. Application Microcontroller for Parking System. *Jurnal Gradien Vol.3 No.1 Januari 2007* : 200-203

7. BIBLIOGRAPHY

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