

EFFECTIVENESS OF ATTENDANCE SYSTEM USING RFID WITH “DRIVE THRU” TECHNIQUES

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Abstract: Radio Frequency Identification (RFID) is one of many technologies grouped under Automatic Identification such as barcodes, magnetic ink, optical character recognition, voice recognition, touch memory, smart cards, and biometrics. This paper presents the Effectiveness of Attendance System Using RFID with “Drive Thru” Techniques. This project was developed using the engineering design process method. RFID is an important feature because of the ability to detect objects under unique identification. Therefore, a study using Radio Frequency (RFID) is used to improve staff attendance efficiency. The purpose of this project is to improve the system of old attendance and to eliminate the remaining time during the attendance collection. RFID readers located inside each building make it difficult for staff to scan cards. Especially when all parking lots are full. The presence system can be read a few centimeters of “Drive Thru” at the edge of the building or corner which is a low-cost and flexible project. The result shows that if the identity card is not registered, it cannot access the staff attendance. About 70% of respondents agreed with the project based on the questionnaire distribution. In conclusion, “drive-thru” shows staff arriving on time and able to eliminate the rest of the time.

Keywords: Attendance System, RFID, Drive Thru

Introduction

Radio Frequency Identification (RFID) play a big role in people daily lives. Various applications of RFID including transportation and logistics, manufacturing and processing, security, animal tagging, waste management, time and attendance, road toll management and etc. The aim of this research is to improve old attendance system that capable to eliminate time waste during manual collected attendance by create “drive-thru” attendance system. This model can be given an access badge with radio frequency identification (RFID) chip in it as its use technique of electromagnetic fields to exchange data from a tag (like a smart tag) to an object (a reader) at the post guard for the purpose of identification or tracking. Development in RFID technology widely increasing in adopting new and many features.

Literature Review

This section describes previous work down based on attendance system. Today, lots of colleges, schools, and universities have a problem to handle large number of students and staffs specially to get their attendances. Manually, the attendance is given whenever the lecturer comes to class and pass it around for the students to tick. This manual process shows flaws since the students can cheat and lecturer had to enter the attendance into database for record. Zatil Singhal (2012), describes the conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. Krenare R. Pireva (2013) tells that counting students' absence, teachers lose couple of minutes of their classes to fill in the attendance sheet manually by calling the students for signing the documents and the worst just come after classes where there should be spent extra time for inserting the attendance data in a computer to generate the statistics and send them per email to each student and of course to the administrator and lecturer in total. Meanwhile, the staff has to queue up for a long time to punch card and put it in the slot provided according to their name which shows that both system are slow in performance and not efficient express Mr.Tushar T. Tanpure¹ et. al (2013). This would cause a big problem.

Sequel to these, Arulogun O.T (2012) states that lecturers and administration in most developing countries have had to come up with ways to ensure a healthy participation from students and make sure that the students-lecturer interactive relationship is kept intact. However, these strategies are time consuming, stressful and laborious because the valuable lecture time have been used for student attendance taking and sometimes not accurate express Olatunbosun (2012). Besides that, Nurbek Saparkhojayev (2012) support the issue that universities lecturer and institution are considerable disadvantages when it comes to taking attendance since friends of absent students may write down their names and surname. This is really posing a great challenge in academic setting as the attendance is an important part of students' and staff academic record since in some institutions without a certain percentage student cannot sit for an examination tells Barroon Ismaeel Ahmad (2014). These are some of the challenges that call for an improvement as technology has advanced to provide more convenient ways in monitoring the students and staffs.

In this study we implement the Radio Frequency Identification (RFID) technology as one of figures development focuses on staffs of Universiti Pendidikan Sultan Idris (UPSI) as this university have two main campus which is Kampus Sultan Azlan Shah (KSAS) and Kampus Sultan Abdul Jalil Shah (KSAJS) a niche in educational leadership that lead to the global change. The main purpose of this research is to develop a "drive-thru" attendance system for staff UPSI by using Radio Frequency Identification (RFID). The staffs are having difficulties to punch their card as a sign of attendances due to the long distance between two main campuses which is 7.5km from each other's as the staffs might have a lecture at one of the campus. Besides that, the flow of the traffics affect the time of the staffs to arrive punctually for the attendances due to the number of vehicles on the road such as cars, buses and lorries' been using the same routes to their respective journey during peak hour for 8am lecture. The using of RFID in attendance system for staffs UPSI can improve the existing system that capable to eliminate time waste. This statement is supported by Fakolujo O. (2012) that RFID is an automated identification and data collection technology, that ensure more accurate and timely data entry and quickly gained more attentions due to current low cost and advances that open up more application area.

On the other hands, Ankita Agrawal (2013) mentions that RFID systems have been widely used in many different application areas such as; product tracking through manufacturing and assembly, control of inventory, parking lot access and control, container tracking, ID badges and access control, equipment tracking in hospital and etc. which researcher find it is suitable to be use for taking attendances of staffs UPSI. It is one way to improve efficiency as researcher found out the parking problem on Kampus Sultan Abdul Jalil Shah (KSAJS) that is limited for the staffs. If there are any program being held on E-learning building the staffs found out the difficulties to find the parking lots and it's stressing them to punch card for the attendances. Thus, manual attendance system is very time consuming supported by Priyanka A. Sathe (2014).

As a conclusion, RFID system play a big role for the staffs UPSI due to its performance with best user interface and improve old attendance and monitoring system for better results. Question problem is how development of "drive-thru" attendance system outlines that Radio Frequency Identification (RFID) can be applied for this research?

Methodology

Methodology chosen to conduct this project is engineering design process. The engineering design process is an approach used in series of steps by instructional designing, building and testing for developers to create instructional course materials. This process has been adopted due to its iteration flexibility.

The definition of the problem is about the to improve old attendance system that capable to eliminate time waste compare manually collected attendance that lead to unpunctuality of the staff UPSI. This is due to the fact that current transportation infrastructure and car park facility developed are unable to cope with the influx of vehicles on the road (Leng Y.Y, et.al, 2012). This system proposes better service and user friendliness and interactive.

"Drive-thru" attendance system for staff UPSI by using RFID will be created in software and hardware. In hardware, circuit included in this project is PIC 16F877A that be connected to the RFID reader RFID-IDR-232N. The ID will be stored and the tag will be detected by the reader and validation attendance will be display on the LCD display. Meanwhile, in software the system is created that analyzed uses passive RFID as a hardware because it is cheap, small in size and can communicated with Hyper Terminal to display output on PC. The attendance system contains two main components which is reader and tag. A design engineering process of attendance system by using RFID consists of two component which is hardware and software component. A flow chart of design system is shown in Figure 1. Software MTLAB Integrated Development Environment (IDE) and PIC2KIT is being used to test the communication of RFID reader as to determine either the computer can receive the ID tag that was traced by the reader for further processing. As for this project, the vehicles of staff is pass by the security guard that place the RFID reader, it will detect the frequency of the ID tag. The program will continue with combination of hardware and software where the information is send to the pc where it would display the attendance verification on the LCD. It is depending on the tag ID detected by the reader. The RFID reader is connected to the PC and interface base (Serial Port) that converted using USB converter as Figure 2. The prototype of the project is design by using Autodesk Inventor 2016 as shown in Figure 3. Testing of the product is always done to ensure it can be used to meet the users.

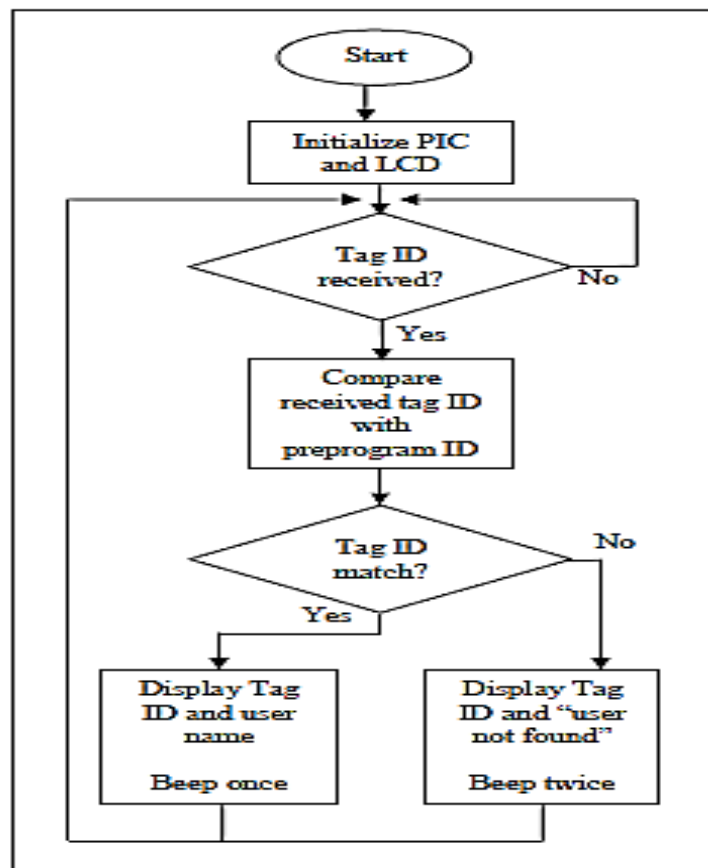


Figure 1 Flow Chart of Design System

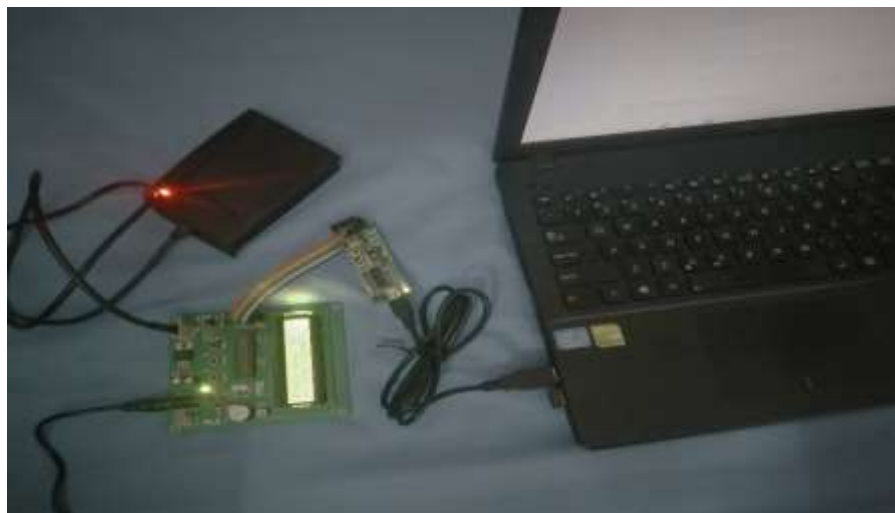


Figure 2 Connection to the PC

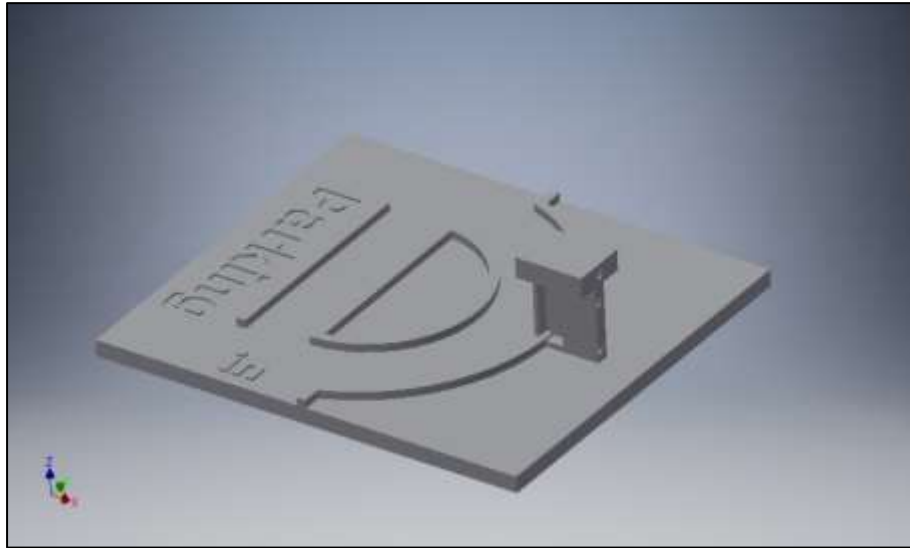


Figure 3 Prototype in Autodesk Inventor

Purpose sampling was correlational studies minimum to obtain a good result is 30 respondents depends on the accuracy or desired error of the researcher and it was adopted from (Uma Sekaram, 2006). There were 30 randomly selected respondents as the questionnaire being distributed randomly to the staff UPSI as respondents either at Kampus Sultan Abdul Jalil Shah (KSAJS) and Kampus Sultan Azlan Shah (KSAS). Data obtained was processed using Statistical Package for the Social Sciences (SPSS) to analyses for demography and variable such as frequency, mean, percentage and standard deviation.

Result and Discussion

There were 30 respondents of various backgrounds providing feedback on the questionnaire that have been given for project “Drive-thru” attendance system for staff Universiti Pendidikan Sultan Idris (UPSI) by using Radio Frequency Identification (RFID). The respondents were determined by the group of gender based on the table 1 below. The result of analysis data based on the questionnaire find out that 16 of the respondents were a male meanwhile 14 of it were female.

Table 1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	16	53.3	53.3	53.3
	Female	14	46.7	46.7	100.0
	Total	30	100.0	100.0	

The composition by race was classified by Malay, Chinese, India and others of respondents. But among that all, the respondents coincidently were 100% Malay, 0% of Chinese, India and others. Table 2 shows the percentage of respondent based on race.

Table 2: Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	30	100.0	100.0	100.0

Based on the Table 3 it shows that most of the respondent in the questionnaire were age around 31 to 40 years old with frequency of 15 respondents (50.0%), meanwhile 7 respondents (23.3%) age around 21 to 30 years old, another 7 respondents (23.3%) age between 41 to 50 years old and one respondent (3.3%) was age 51 and over years old. Besides, there was no respondent under 20 years old.

Table 3: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-30	7	23.3	23.3	23.3
	31-40	15	50.0	50.0	73.3
	41-50	7	23.3	23.3	96.7
	51 and over	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

There are various department at Universiti Pendidikan Sultan Idris (UPSI) and researcher randomly pick the respondents which was staff and the list shown as Table 4 below.

Table 4: Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BPQ	2	6.7	6.7	6.7
	BRPKKP	3	10.0	10.0	16.7
	FPE	3	10.0	10.0	26.7
	FPM	2	6.7	6.7	33.3
	FPTV	2	6.7	6.7	40.0
	FSKIK	2	6.7	6.7	46.7
	ICT	6	20.0	20.0	66.7
	MPN	1	3.3	3.3	70.0
	PKM	1	3.3	3.3	73.3
	PTB	7	23.3	23.3	96.7
	PULAMI	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

Based on Table 5 it shows that 26 of the respondents (86.7%) knows about the Radio Frequency Identification (RFID) meanwhile 4 of the respondents (13.3%) does not know about the Radio Frequency Identification (RFID).

Table 5: Have you ever heard about the Radio Frequency Identification (RFID)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	86.7	86.7	86.7
	No	4	13.3	13.3	100.0
	Total	30	100.0	100.0	

Analysis on Perception of Staff UPSI about the “drive-thru” attendance system for staff UPSI by using Radio Frequency Identification (RFID) based on the questionnaire was using Likert scores to represent feedback.

Scale	Explanation
1	Strongly Disagree (SD)
2	Disagree (D)
3	Undecided (U)
4	Agree (A)
5	Strongly Agree (SA)

Among all of the questions, the statement of “drive-thru” attendance system make staff like easier had the highest mean with 3.93 and follow with statement it enhances the quality time to manage as staff do not need to find the parking first for punch card with mean 3.90 as shown in Table 6 and Table 7 respectively.

Table 6: “Drive-thru” attendance system makes staffs life easier.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean
Valid	Disagree	3	10.0	10.0	10.0	3.93
	Undecided	5	16.7	16.7	26.7	
	Agree	13	43.3	43.3	70.0	
	Strongly Agree	9	30.0	30.0	100.0	
	Total	30	100.0	100.0		

Table 7: It enhance the quality time to manage as the staff do not need to find the parking first for punch card.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean
Valid	Disagree	5	16.7	16.7	16.7	3.90
	Undecided	2	6.7	6.7	23.3	
	Agree	14	46.7	46.7	70.0	
	Strongly Agree	9	30.0	30.0	100.0	
	Total	30	100.0	100.0		

Meanwhile, question of RFID is suitable to be put at the one of the side corner such as at E-Learning and museum UPSI of Kampus Sultan Abdul Jalil Shah (KSAJS) and security guard at campus Sultan Azlan Shah (KSAS) shown in Table 8, had the least mean 3.57 which shows that it need additional places of RFID zone. This can conclude that the higher the mean, the greater the distribution of the data.

Table 8: RFID is suitable to be put at the one of the side corners such as at E-Learning and museum UPSI of Kampus Sultan Abdul Jalil Shah (KSAJS) and security guard at campus Sultan Azlan Shah (KSAS).

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean
Valid	Strongly Disagree	1	3.3	3.3	3.3	3.57
	Disagree	5	16.7	16.7	20.0	
	Undecided	5	16.7	16.7	36.7	
	Agree	14	46.7	46.7	83.3	
	Strongly Agree	5	16.7	16.7	100.0	
	Total	30	100.0	100.0		

The lowest mean was 2.77 with the current attendance system take a lot of time to mark the attendance shown in Table 9. This indicate respondents were not agree with this statement because they thought it's functional the same as current system. In overall, the findings of the analysis have received positive responses from the respondents about project of "Drive-thru" attendance system for staff UPSI by using Radio Frequency Identification (RFID). They though with this project it's manage the time properly to arrive punctually and capable to eliminate time waste.

Table 9: The current attendance system takes a lot of time to mark the attendance.

		Frequency	Percent	Valid Percent	Cumulative Percent	Mean
Valid	Strongly Disagree	4	13.3	13.3	13.3	2.77
	Disagree	9	30.0	30.0	43.3	
	Undecided	8	26.7	26.7	70.0	
	Agree	8	26.7	26.7	96.7	
	Strongly Agree	1	3.3	3.3	100.0	
	Total	30	100.0	100.0		

Conclusion

The project of “Drive-Thru” attendance system for staff UPSI by using RFID have achieved as stated objectives as researcher set and it’s completed within specific time. The acceptance level of the respondents on this project “drive-thru” attendance system for staff UPSI by using RFID is well received based on respondents’ responses in the questionnaire that being analyzed. There are some aspects that can still be improved in the future. Overall, the respondents are satisfied and thought that it will improve the performance of their attendance.

Respondents do state the weakness for having the “drive-thru” attendance system for staff Universiti Pendidikan Sultan Idris (UPSI) by using Radio Frequency Identification (RFID) which is firstly, cost. Respondents argued that the cost of the product which the hardware and software must be considered during implementation around the Universiti Pendidikan Sultan Idris (UPSI) would cost a lot. The RFID tag for the staff, RFID reader, server and maintenance would increase compared to the current system. Data management will me mixed with current data which are not practical and would increase the cost to repair it.

Secondly, few of the respondents does not agree with this project because they thought that the traffic would become worst as the new attendance system only places at 3 locations only and should place more such as at Bitarasiswa and SITC hall. Respondents thought that it is not practical and only will give difficulty to monitor staff attendance.

Thus, improvement aspects must be done to improve the quality of the “drive-thru” attendance system for staff UPSI by using RFID which is improvements in terms of research instruments. For this study, researcher used questionnaire as medium to see the effectiveness of the project “drive-thru” attendance system for staff UPSI by using RFID. In the future, researcher may use others method or instruments such as interview with respondents for more accurate information which can be authentic information.

Besides, the development system can be improved and upgraded in the future with extending some new features or offer further enhancement such as long range contactless access control system to monitor staff attendance record which are functional like smart tag that would increase the efficiency of the attendance of the staff UPSI.

In a conclusion, the “drive-thru” attendance system for staff Universiti Pendidikan Sultan Idris (UPSI) have successfully achieve the objectives and answered the previous

speculation. This project is able to improve the old attendance system for staff Universiti Pendidikan Sultan Idris (UPSI).

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