BOARDING SCHOOL STUDENTS MONITORING SYSTEMS (E-ID) USING RFID

Herdawatie binti Abdul Kadir, Siti Nurul Aqmariah binti Mohd Kanafiah and Mohd Helmy bin Abd. Wahab
Faculty of Electrical and Electronic Engineering
Universiti Tun Hussein Onn Malaysia
86400 Parit Raja, Batu Pahat
Johor, Malaysia
email: watie@uthm.edu.my , nurpurnama84_ct@yahoo.com and helmy@uthm.edu.my,

ABSTRACT

Nowadays, RFID is an important element that provide an automatic physical objects identification without the need for line-of-sight communication. Currently, boarding school management have difficulty to monitor their student using the old-fashioned paper system; where the procedures were inefficient and brings difficulty to the hostel management to monitor the student movement . By using RFID technology, the looking for student movement is quick and easy. The application of RFID Matric Card system as a Boarding School students Monitoring System (E-ID) will improve the school management procedure , monitor the interest group movement automaticly and increase the safety of students. In order to analyze and design the system, customer who wants to implement this application must have their matric card embedded with RFID tag .When matric card pass through the RFID reader; the system will trigger the data from the RFID tag to the database. Then the data will be sent online to the school management for monitoring purposes. The software used for developing this system includes Microsoft Visual Basic 6.0 for designing Graphical User Interface (GUI), Microsoft Access Software for database management system and Dreamweaver for online networking system. This research work offer important implication for monitoring the boarding school students and ease the workload of the school management and save time for various student activities.

Keywords : RFID, monitoring system, passive tag, boarding school

1 INTRODUCTION

AUTO-ID Technologies have been used to reduce the time and main power to input data manually i.e. barcode and smartcards. Radio Frequency Identification (RFID), is a technology which uses radio waves to detect man, animals, data, or any other materials automatically by detecting a kind of microchip, where it is transmitted through an antenna. The combination of the microchip and antenna makes it to be known as RFID tag. The benefit of using the RFID is that it does not have to be placed directly under the scanner, unlike the barcode that must be scan first to get the information.

The RFID system contains three main components for functioning which is antenna or coil, transceiver (with decoder), and RFID tag. The antenna will transmit radio signal

to activate the tag so the data the data could be read or write. The storage and extraction of the data uses a special device which is known as RFID tag. This tag can be attach anywhere on anything and even able to be inserted in the human body. Literatures show that RFID has been applied in various fields such as supply chain[1]; in company such as Wal-Mart ,Proctor and Gambler , construction [2]; vehicle identification management system, library [3]; books positining and health [4] i.e store patient records, and preparation of medicine. the use of RFID system can reduce operating cost and simplify data storage and retrieval[5]

Therefore the application of RFID matric card system as the boarding school information systems have been build based on research of the literature that have been made in other aspect . In Malaysia, the usage of this technology has not yet been expanded. It is only used as a personal identity in the working place, smart tag in PLUS highway and price tags in market. Upon realizing the important of RFID to this generation it will be useful many of researcher done it to apply this technology to encounter by most boarding school in Malaysia where the management found that maintaining

students in/out records are difficult; misinformation ,untrue information and difficulties to locate students

In this project, the RFID tags enable the school management to track the student movement in and out of the hostel. The individual without the RFID card when will trigger the alarm and also capable to inform the school management about the availability of the students using an online monitoring system. This system used the main component of passive RFID system, database management system and networking i.e wireless . When the RFID tag pass through the RFID reader in read range zone , the system will record the data from the RFID tag to the database system. Then the data will be sent online to the management for the supervision of students. This will ease the management to monitor the availability of hostel student and access the student personal record.

2 MONITORING SYSTEM DESIGN

This section explains the initial design of the system, from the RFID tag to the display data on computer screen. In overall concept, RFID will be detected when someone that has a RFID tag passes through the RFID reader. Then, data from RFID tag will be searched in the database through Microsoft Visual Basic 6.0 as a interface. List of student database will be displayed in the host computer and its directly will be sent to the school management using online system. Fig 1 shows the operation of the monitoring system.

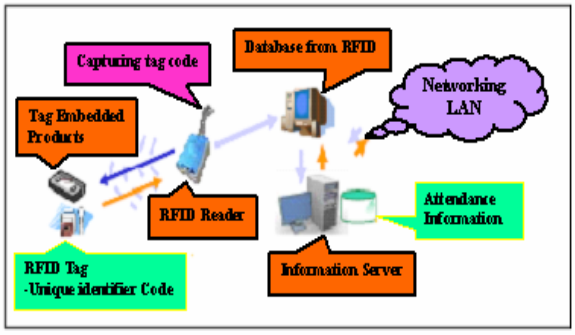


Fig1 : The Operation of The Monitoring System.

The project's criteria that will be used have been researched first before these criteria have been chosen. All of the aspects like range, frequency, and all of suitability for this project situation have been known. Table 1 shows the project's criteria.

CRITERIA	SOLUTION
Type of RFID	Passive
Frequency	13.56MHz (High Frequency)
Range	3 meters
Life	Unlimited
Source of power supply	- Uses the radio wave broadcast by the reader to energize its operation. (magnetic alternating field) - Principle is similar to an electromagnet transferring power via magnetic force, but RFID reverse the process to transform magnetic force into a power source.
Type of software	- Microsoft Visual Basic 6.0 - Microsoft Access - Dream weaver
Others Typical application	Access control, item level tracking, smart card,
Networking	LAN

Table 1: The Project's Criteria

3 SYSTEM IMPLEMENTATION

An experiment have been conducted in order to test the functionality and performances of E-ID system interm of reader conversion power and tags distance ; condition which are in shielding room, outside room with low noise present and outside room with high noises present.

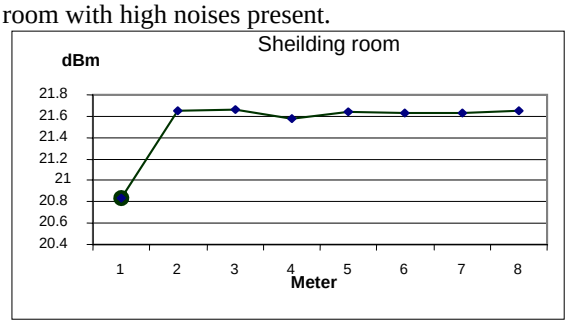


Fig 2 :The effect of the distance v/s conversion of power

In the first condition, the tag and the reader is placed in a hilding room ,i.e. class room. The tags were aligned with respect to the transmit antenna with varying distance position. From the results in fig 2, we can conclude that the operating maximum power in dBm is 21.65dBm. It conveys meaning

that tags give good performance when they are aligned with the transmit antenna and not affected by environment interferences but effected by reflection and absorption; where the signal wave collides with a reflected wave and hits a solid object, the object may absorb some of the waves energy.

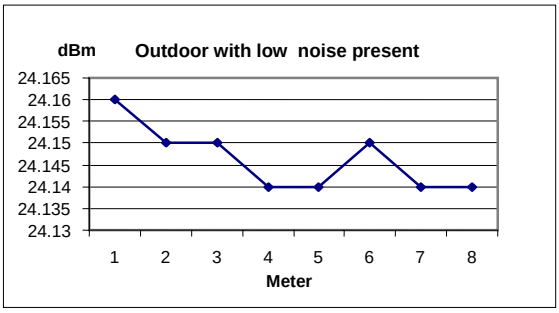


Fig 3: The effect of the distance v/s conversion of power

In this second condition, the tag and reader antenna is placed outside with minimum disturbance of peoples and electronic appliances ; mobile phone, television and radio Refering to fig 3 , it can be noticed that the operating maximum power is 24.14dBm; effected minimum environments producing the electromagnetic (EM) noise and normal moisture levels within the air. The pattern of power decrease as distance get larger due to effected by environment interferences.

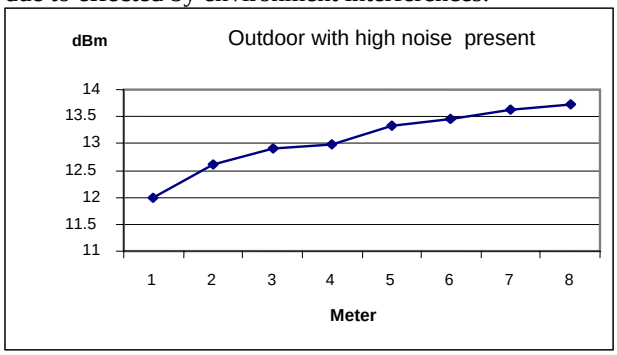


Fig 4 :The effect of the distance v/s conversion of power

When RFID tag is being expose to high noise environment ; noises of people, handset and wheather i.e. raining , the operation maximum power obtain were 13.724dBm as shown in figure 4. There disturbance occur in data analysis because of the present of many noises in the environment due to carrier interference; absorption, reflecting /nulling, electrical and skip interference. From the analysis, although these tags rely on slightly different conditions to provide power to the tag and have a shorter read range, but there is nothing about them which makes them safe against a variant of this power-analysis attack due to environment changes especially by mobile phones. The modern hand phones air interface protocol is more complex than the RFID air interface, it can be used to attack and kill UHF tags although have different frequencies and antennas. With capable of attacking HF tags and this situation is very crucial while the E-ID system is acquiring data from the matrix card due to the data lost and conflict.

Implementation of the system is an important part in development project The interface program is using Microsoft Visual Basic 6.0, Microsoft Office Access 2003 for database management system and Dreamweaver (.asp) for online networking system.

i) Database Design

The database have been created from this system consist of three tables that are attendance, student_registration and users. The detail information in every table is shows in table 4.1

Table 2: Attributes of Tables about Attendance Profile

Table	Function	Field Name	Data Type
Attendance	Save the student attendance	No (Primary Key)	Auto Number
		Matric_No	Text
		TagID	Text
		Name	Text
		Time	Date/Time
		Date	Date/Time
		Status	Text
Student_Registration	Save the student information	Matric_No(Primary Key)	Text
		TagID	Text
		Student_Name	Text
		Registration_Date_Time	Date/Time
		IC_No	Text
		Sesi_Form	Text
		Address	Text
		Postcode	Text
		City	Text
		State	Text
		Gender	Text
		Phone_No	Text
		Handphone_No	Text
		Email	Text
		Block	Text
		pics	Text
Users	Save the UserID & password	userID	Text
		password	Text

ii) Microsoft Visual Basic 6.0 Interface Design

Figure 5 shows the Flow Chart for Boarding School Student Monitoring System in this project. First, the RFID set should be turn on & the tag must be placed in a reading range. Antenna will

generated the radio frequency field to the tag. Then, RFID will be detected after reader receive signal from the tag. At Visual basic interface at *form attendance*, it have two assessment either RFID tag have been registered or not . If RFID tag has been registered, system will take the attendance with progress will display 'Sila masuk'. Attendance student will be saved in database. If tag has not been registered, progress will display 'Tag belum didaftar'. Click *Registration* button at *form attendance* to register the tag. After register the tag,, click *Exit* button & it will going to form attendance again to take the attendance. This process will repeat if the student that have a tag pas s through the antenna reader. Then the attendance will be taken. Flow chart for Boarding School Student Monitoring System at visual basic interface system is shown Figure 5.

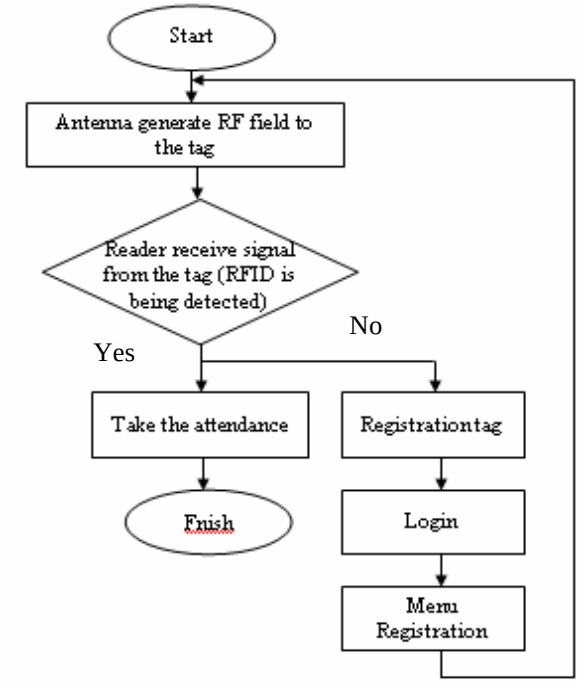


Figure 5: Boarding School Student Monitoring System at Visual Basic System.

Some snapshots of E-ID are provided in Figure 6

(a) (b)

(c)

Figure 6: Visual Basic Interface Development System

iii) Web Server (Dreamweaver .asp) Design

The web server (dreamweaver) has been developing to ease the management system to monitor the student movement in preferred places. The function of web server is to register the student information (except Tag ID) and to monitor the attendance list of the students using networking ;i.e. Local Area network (LAN) or Wireless. The interfacing were develop using Macromedia Dreamweaver MX software and flow chart of the online system is shown in Figure 7 and Figure 8 shows the relationship of the overall system.

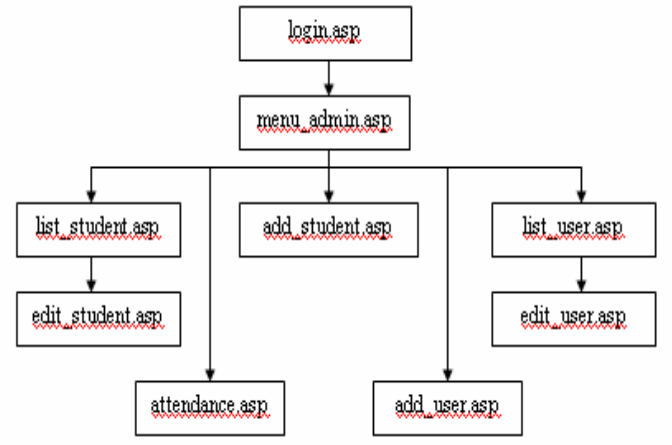


Figure 7: Flow Chart of the online system

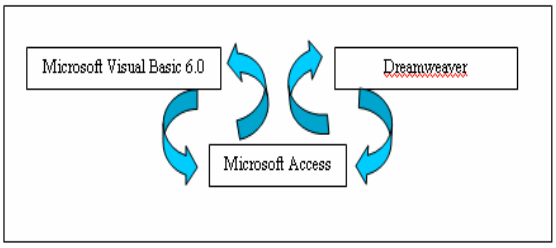
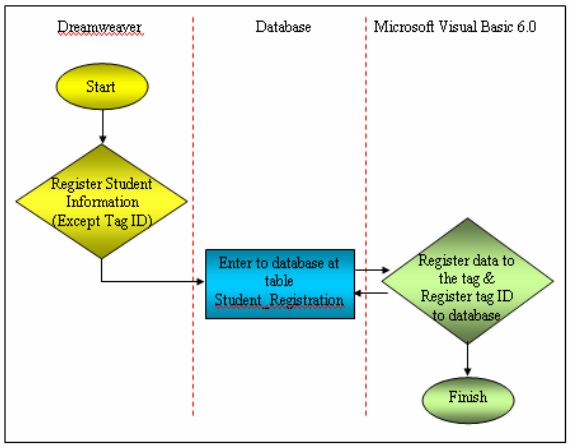
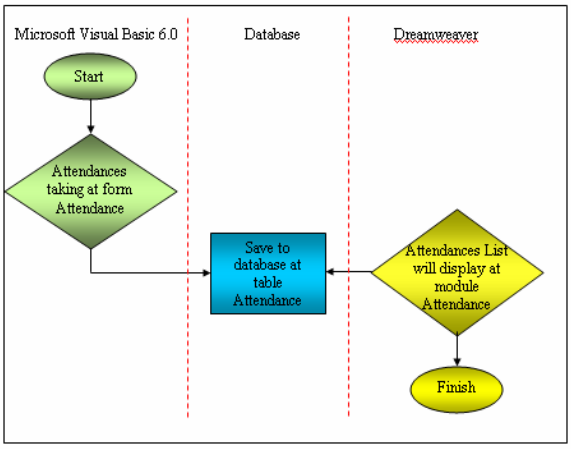


Figure 8: Relationship among the Microsoft Visual Basic 6.0, Microsoft Access, and Dreamweaver.



(a) Registration



(b) Attendance Taking

Figure 9: Flow Chart of Relationship for overall system. (a) Registration & (b) Attendance Taking

4 CONCLUSION

Nowadays, RFID have been one an important element or components especially in industry and in human life. RFID systems provide an automatic means to identify physical objects without the need for line-of-sight communication. The research that have been done are very important for the builder to support the objective of the boarding school management development. It was found that tags give better performance when they are aligned with the transmit antenna, the radiation pattern of an RFID tag antenna determines the ability to read the tag in any orientation, and RFID performance is low when it operates in the presence of an interfering signal. In our next research we will consider the security issue of the system to enabling the system to be immune from any attack ; unauthorized data read and manipulation,sniffing of radio signal for replicate/ modfy signals and inffected by RFID viruses.

ACKNOWLEDGMENT

I would like to express my gratitude to associate professor Ayob bin Johari and all of the staff at Faculty of Electrical Engineering & Faculty of Information Technology & Multimedia for their support and leads to the completion of this project.

REFERENCES

[1] Wong, K.H.M.; Chan, A.C.K.; Hui, P.C.L.; Patel, C.A., A Framework for Data Flow in Apparel Supply Chain Using RFID Technology" , Industrial Informatics, 2006 IEEE International Conference on Aug. 2006 Page(s):61 - 66 .

[2] Ming Lu et al., " Positioning and tracking construction vehicles in highly dense urban areas and building construction sites", Automation in Construction ,2007, pp 647–656

[3] Singh, J., Brar, N., and Fong, C. (2006). The State Of RFID Application in Libraries. *Information Technology and Libraries 2006.* . Vol. 25. No. 1. pp. 24-32.

[4] Wang, S-W., Chen, W-H., Ong, C-H., Liu, L., and Chuang, Y-W., RFID Application in Hospitals: A Case Study on a Demonstration RFID Project in a Taiwan Hospital. *Proceedings of the 39th Annual Hawaii International Conference on System Sciences 2006*. 04-07 January 2006. pp. 184a - 184a.

[5] 5.Nemeth, P.; Toth, L.; Hartvanyi, , "Adopting RFID in supply chains" , Mechatronics, 2006 IEEE International Conference on July 2006 Page(s):263 – 266.