

# Online students supervision (OSS ) systems using passive RFID

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## Abstract

*Automatic identification technologies have been used to reduce the time and manpower to input data manually i.e. Barcode, smart card, radio frequency identification (RFID), biometric technology and optical character recognition. Currently RFID has become one of the hottest technologies implemented in a wide range of application i.e. ; these include road tolls, bus and trains payment, security tags and luggage labels used in some airports. 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. Based on the above-described overview on RFID, this study attempts to apply the technology in online supervision system to ease the school /university management system to monitor the interest group. The OSS system used the main component of passive RFID system, database management system and online networking. When the RFID tags pass through the RFID reader, the system will record the data from the RFID tag to the database systems. Then the data will be sent online to the management for the supervision of students. This system will ease the school/university management people to monitor the availability of each student in the interest zone and this enhance the school management procedures, monitor the interest group movement automatically and increase the safety of students.*

Keywords: passive tag, RFID, online monitoring, student supervision

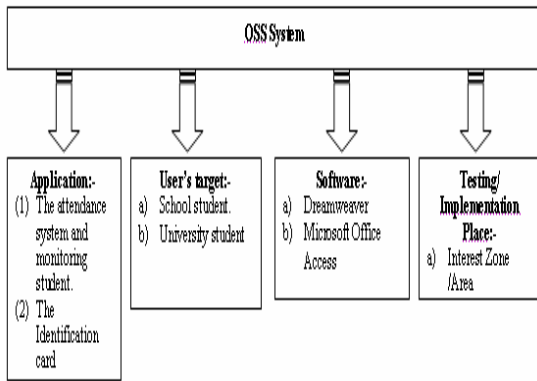
## 1 INTRODUCTION

Old fashioned student supervision system was difficult to identify the location of the student and who violated the authorized area. To overcome this the Radio Frequency Identification (RFID), is a technology which is chosen upon realizing the explosion of interest in this technology where its deployment in numerous application, including supply chain[1], construction [2], library [3],health [4] and supply

chain[5]. The RFID system contains three main components to ensure its well-functioning which are antenna or coil, transceiver (with decoder), and RFID tag. The antenna will transmit radio signal to activate the tag so the data could be read or write. The storage and extraction of the data use a special device which is known as RFID tag. This tag can be attached anywhere on anything and even able to be inserted in the human body; there are two types of tags, passive with no on board power source and active with an on board power source. In this project, the RFID tags enable the school/university management people to supervise the student movement in and out of the school/university. An individual without the RFID card will trigger the alarm and also capable to inform the school/university management people about the availability of the students using an online monitoring system. This system uses the main component of passive RFID system, database management system and networking i.e. wireless. When the RFID tags pass through the RFID reader in read range zone, then system will record the data from the RFID tags to the database systems. 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.

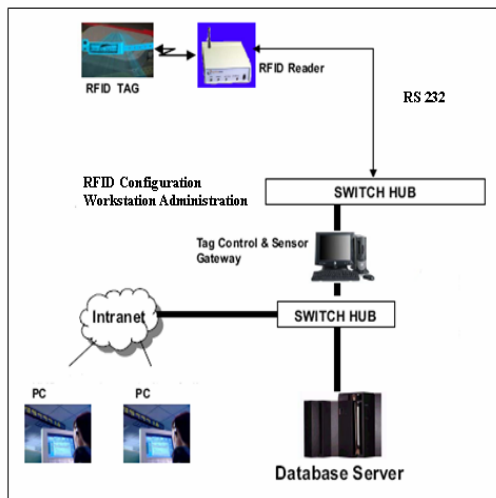
## 2 ONLINE MONITORING SYSTEM

An online user interface has been developed to ease the management system to monitor the student movement and search the student data easily. By using Matric Card embedded with RFID tags, the system can be applied in everywhere to ease the management system to monitor the users; where RFID system provides batch access, storage mass data and reprogramming which are better than barcodes. Applying RFID can promote operational efficiency and precision. Figure 1 shows the scopes that can be used for this system.



**Figure 1:** The Frame of theory in research of application of RFID Matrix Card System as a user's information system

In general concept, we designed the RFID to detect when the person with an RFID tag passes through the RFID reader, the data identification from the RFID tag will record the movement (i.e location and time in/out) in the database system . If the student violates certain area without permission, the system will directly send an alarm to the school management and security by using the OSS system where the location and student identification can be found on the OSS system. Fig 2 shows the operation of the monitoring system.



**Figure 2:** OSS System architecture

### 3 SYSTEM IMPLEMENTATION

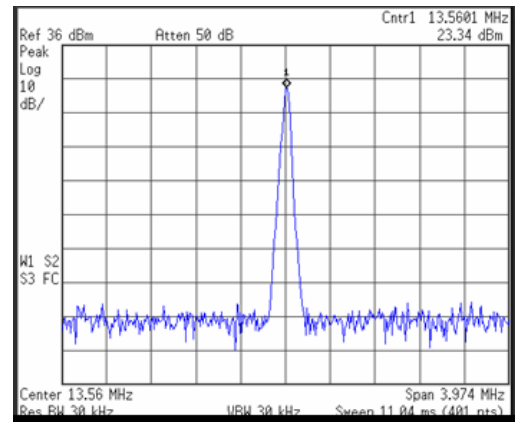
#### i) Tags performance

An experiment has been conducted in order to test the functionality and performances of OSS system technologies in several environment conditions such as

outdoor with low and high noise and with normal moisture levels within the air. The RFID tag is placed near the antenna and the distance will be increased to study the conversion of power in 8-meter range.

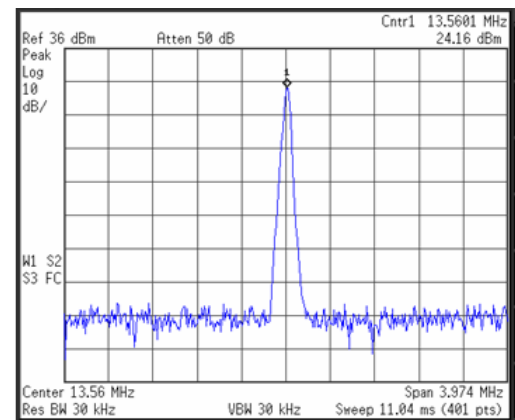
In first condition, the tag and the reader antenna are placed outside with minimum disturbance of people and electronic appliances ; mobile phone, television and radio Referring to fig 3 , it can be noticed that the operating maximum power was 24.14dBm; affected by minimum environment producing the electromagnetic (EM) noise and normal moisture levels within the air. The pattern of power decreases as distance gets larger due to the effected of the environment interferences.

#### Distance 0 meter



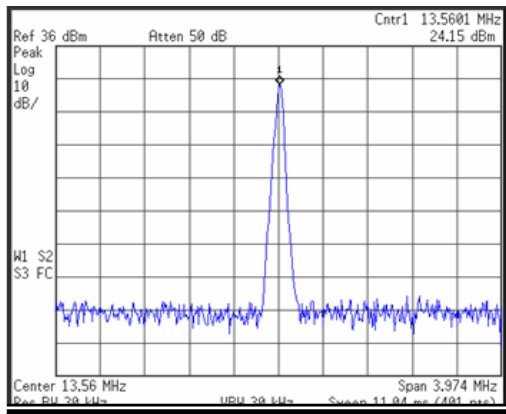
(a)

#### Distance 1 meter



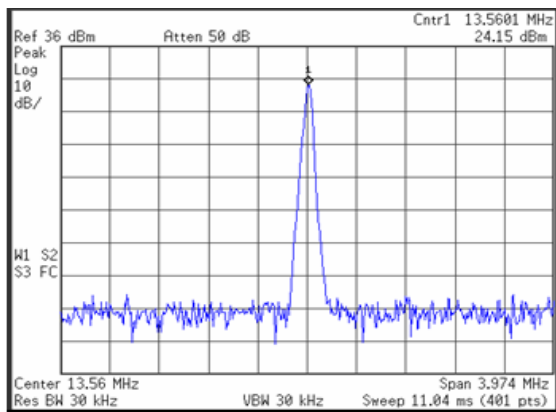
(b)

#### Distance 2 meter



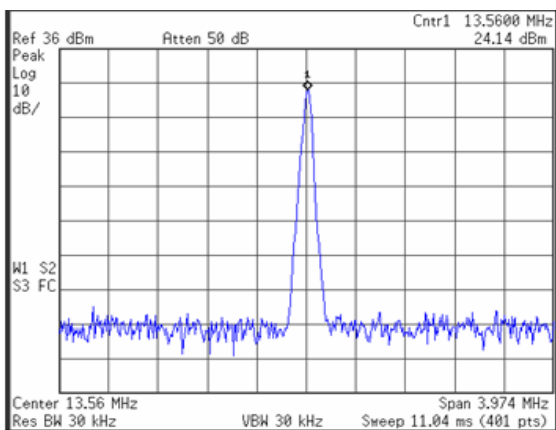
(c)

Distance 3 meter



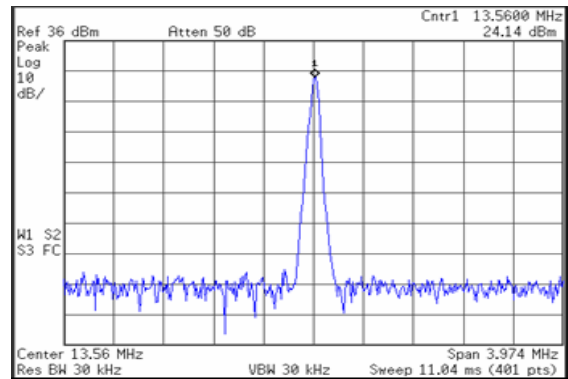
(d)

Distance 4 meter



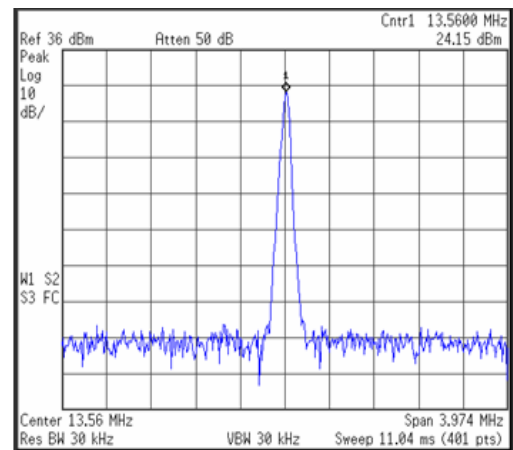
(e)

Distance 5 meter



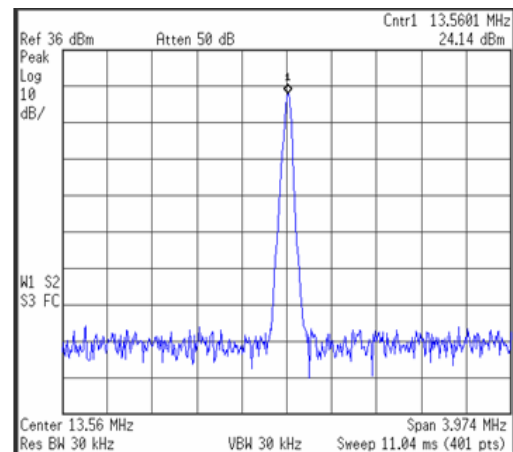
(f)

Distance 6 meter



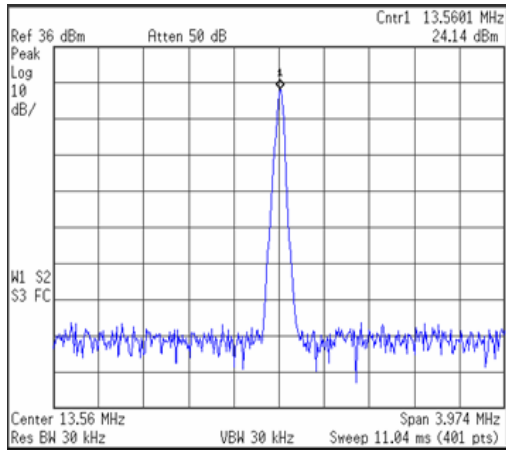
(g)

Distance 7 meter



(h)

Distance 8 meter



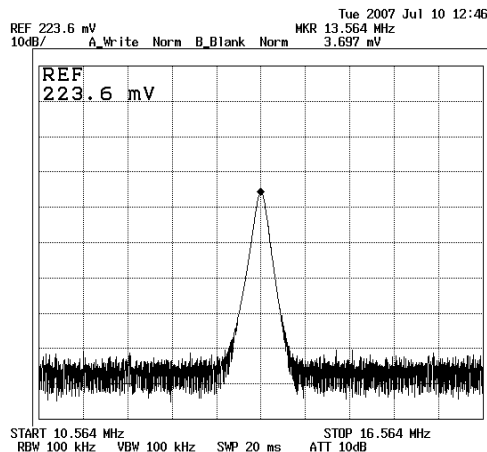
(i)

Figure 3: Outside Room with low noise

### Outside Room with high noises

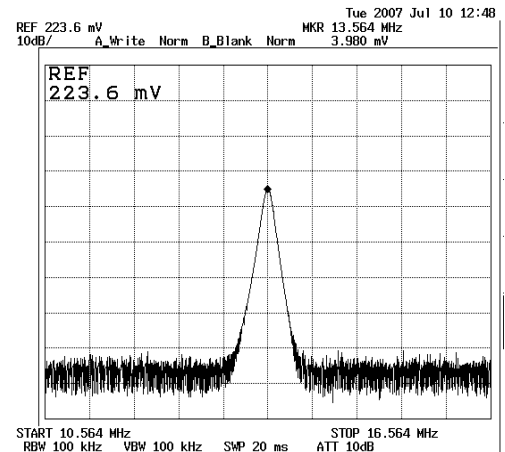
When RFID tag is exposed to high noise environment; noises of people, handset and weather i.e. rain , the operation maximum power obtained was 13.724dBm as shown in figure 4. There were disturbances occurred in the data analysis because of the present of noises in the environment due to carrier interference; absorption, reflecting /nulling, electrical and skip interference.

#### Distance 0 meter



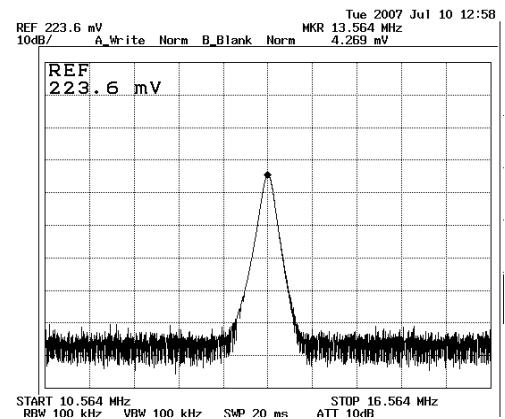
(a)

#### Distance 1 meter



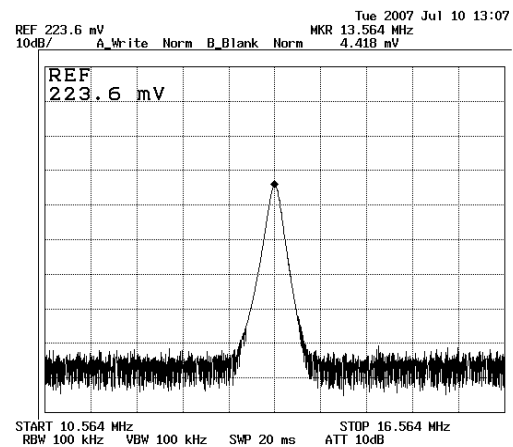
(b)

#### Distance 2 meter



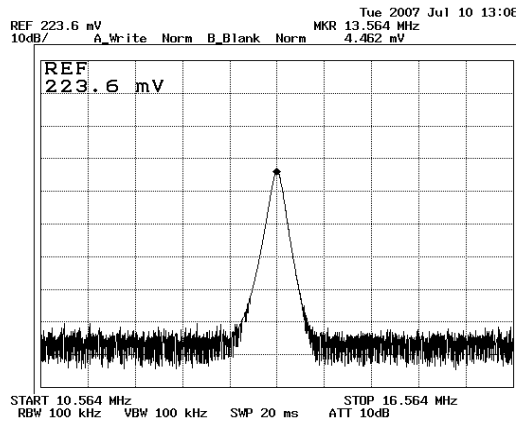
(c)

#### Distance 3 meter



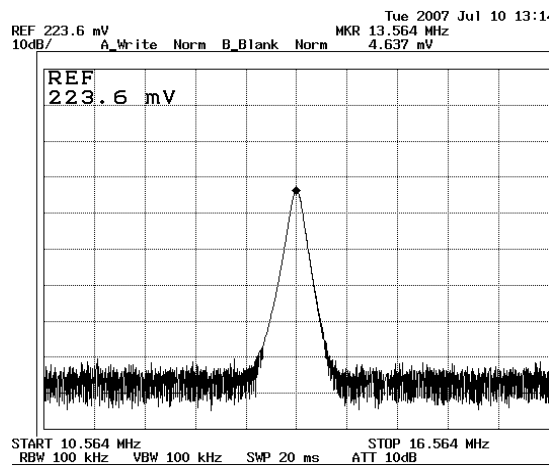
(d)

#### Distance 4 meter



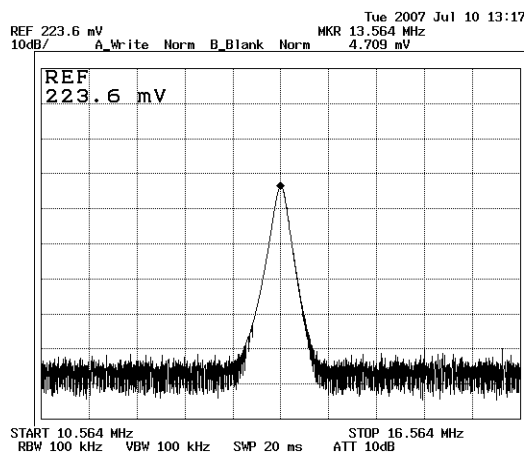
(e)

### Distance 5 meter



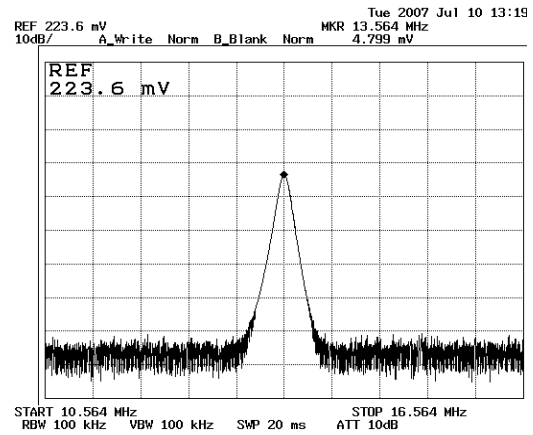
(f)

### Distance 6 meter



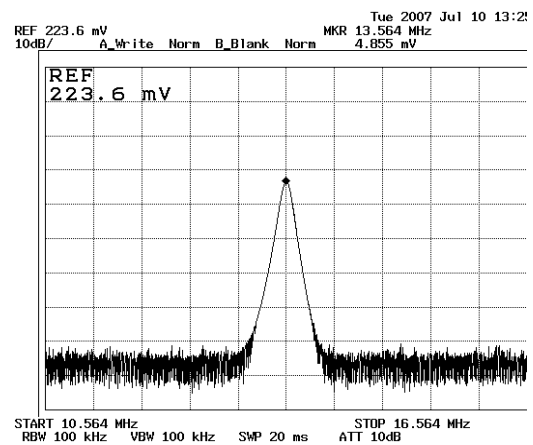
(g)

### Distance 7 meter



(h)

### Distance 8 meter



(i)

Figure 4: Outside Room with low noise

From the analysis, although these tags rely on slightly different conditions to provide power to the tag and have a shorter read range, 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 and it can attack and kill UHF tags although with different frequencies and antennas. With the capability of attacking HF tags and this situation is very crucial due to it can contribute to the lost and conflict of data.

### ii) Database Design

The database which has been created from this system consists of three tables, that are attendance, student registration and users. The detailed information in every table is shown in table 1

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
		Sex Format	Text
		Address	Text
		Postcode	Text
		City	Text
		State	Text
		Gender	Text
		Phone No	Text
		Handphone No	Text
		Email	Text
		Block	Text
Users	Save the UserID & password	userID	Text
		password	Text

Text

Table1: Attributes of Tables about Attendance Profile

### iii) Interface Design

In this project development, the four important aspects need to be emphasized that are Microsoft Visual Basic 6.0 programming language, Microsoft Access database design, Macromedia Dreamweaver MX networking online connecting between student and management, and RFID set equipment. The whole system already successfully implemented with the combination of these four aspects. The web server (dreamweaver) was developed ease the management system to monitor the student's movement in preferred places. The softwares that have been used in this project are Microsoft Visual Basic 6.0, Microsoft Access and Dreamweaver. Microsoft Access is used as a storage information system. Microsoft Visual Basic is used to take the attendance and register the tag ID whereas Dreamweaver (web server) is used to online the system which displayed the attendance list to the web server to ease the management system. The function of the web server is to register the students information and monitor the students' attendance lists using networking ;i.e. Local Area network (LAN) or Wireless. The interfacing was developed using Macromedia Dreamweaver MX software and the flow chart of the online system is shown in figure 7 .Figure 8 shows the relationships of overall system.

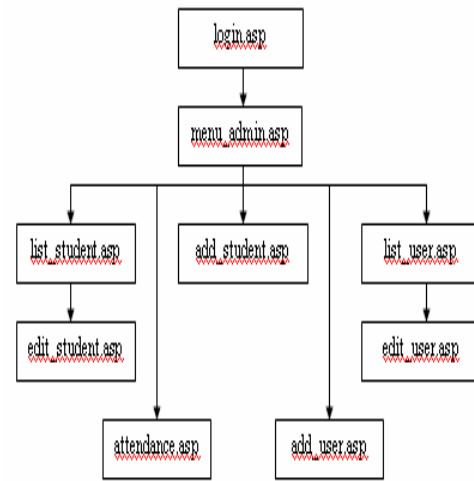
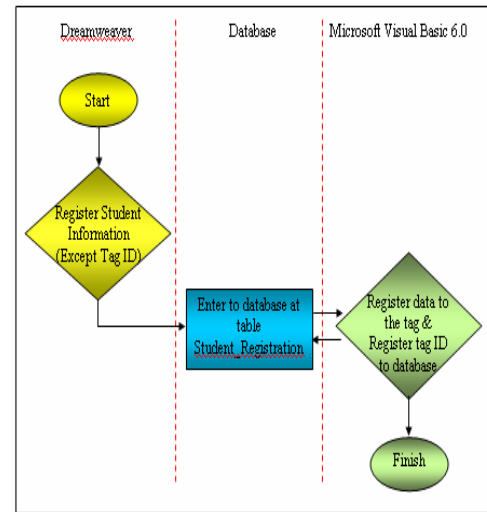
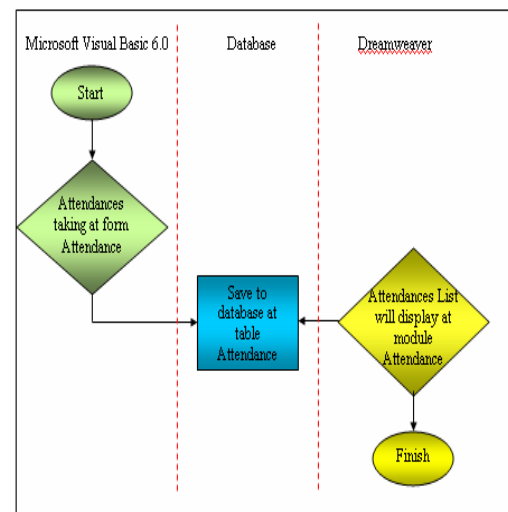


Figure 7: Flow Chart of the online system



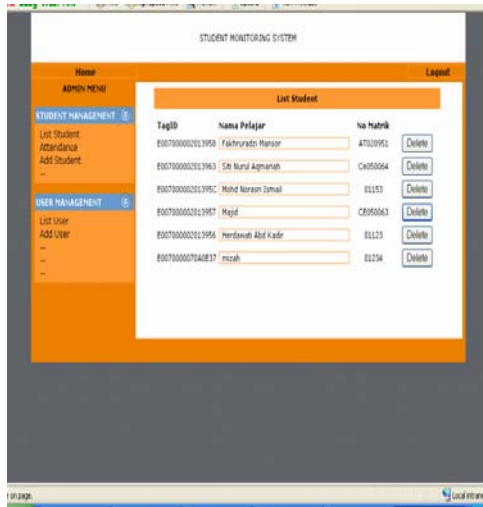
(a) Registration



(b) Attendance Taking

**Figure 8:** Flow Chart of the relationships of overall of the system.  
(a) Registration & (b) Attendance Taking

Some snapshots of OSS system are provided in Figure 9



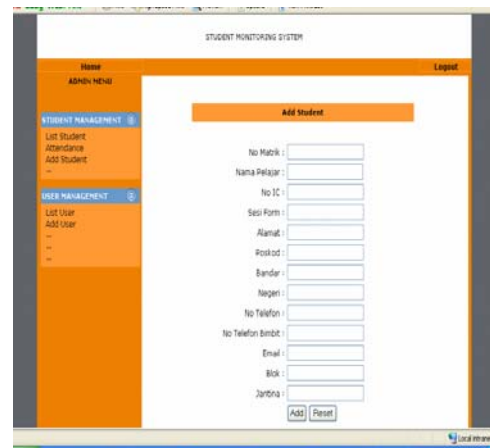
(a)



(b)



(c)



(d)

**Figure 9:** Visual Basic Interface Development System

The usage of Microsoft Visual Basic 6.0 is very important and the main function to build the system is because Microsoft Visual Basic 6.0 functions as a link between hardware and software. Additionally, it functions to send information to the online networking system through intermediary database system. Generally, database is also important role in this system which it acts as storage space data that will be taken from interface of Microsoft Visual Basic 6.0 and also from the web server. The database that has been used in this project is Microsoft Office Access 2003. It has been selected because the software is attached by Microsoft office besides Microsoft

Word, Microsoft Power Point and etc. Additionally, Macromedia Dreamweaver MX has been used in this system to ease the information can be delivered by online networking system to the management. Active Server page (ASP) is used to develop the website and it runs inside a server called IIS (Internet Information Service). ASP uses server side scripting to dynamically produce Web pages that are not affected by the type of browser the web site visitors are using. The default scripting language used for writing ASP is VBScript. Overall the monitoring system has achieved the objectives of the project that are to develop monitoring system using RFID , to design an online student monitoring system for boarding school, and to develop an attendance system which is faster and fool proof. From the prototype aspect this system has functioned successfully and ready to be used.

## 4 CONCLUSION

Supervision based upon RFID is hoped can replace the manual system that transformation of information can be delivered without a hitch. Generally, a prototype has been built to help universities / school management enhance the school management procedures, monitor the interest group movement automatically and increase the safety of students. It is proven that tags give better performance when they are aligned with the transmit antenna 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 enable the system to be immune from any attack; unauthorized data read and manipulation, sniffing of radio signal for replicate/ modify signals and infected by RFID viruses.

## ACKNOWLEDGMENT

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