

ABSTRACT

Life-threatening fever such as Malaria and Typhoid are treated manually at most of the hospitals nowadays. The nurses have to check the temperature and pulses of suspected victims at certain hours in a day. What makes it dangerous is that in between the interval hour, the patient is all alone without supervision from the nurse or the doctor. If at this time the temperature of the patient is suddenly rising over 39°C, it can be fatal. Besides, patient's blood sample needs to be taken when his/her body temperature is at the highest level to confirm the diagnosis of the disease and identify the infectious parasites. This project "Body temperature detection system for malaria and typhoid fever patient using RFID and GSM network" comes into picture. As the temperature of the patient exceeds the limits, RFID active tag will be triggered, communicate with the RFID reader at nurse's station, notify nurse through alert popup and then, nurse will SMS to the doctor on duty using GSM Modem. With this, the patient will receive the right treatment at the right time.

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LIST OF ABBREVIATIONS

RFID	RADIO FREQUENCY IDENTIFICATONS
GSM	GLOBAL SYSTEM FOR MOBILE
RF	RADIO FREQUENCY
VB	VISUAL BASIC
GUI	GRAPHIC USER INTERFACE
SMS	SHORT MESSAGING SERVICE
SIM	SUBSCRIBER IDENTITY MODULE
AT	ATTENTION COMMANDS
PCMCIA	PERSONAL COMPUTER MEMORY CARD INTERNATIONAL ASSOCIATION
USB	UNIVERSAL SERIAL BUS

CHAPTER 1

INTRODUCTION

1.1 Background Study

This project is basically about a system that can notify nurses immediately after temperature rise from remote location involving Malaria and Typhoid fever patients in the hospital and also alerting the ideal time to take blood sample for diagnosis. These patients are known to have irregularities in body temperature. The ideal time to take blood sample from them is when the temperature is at its highest level. By using the system, whenever the body temperature is exceeding the limit that has been set, the system will be activated. The system uses Radio Frequency Identification (RFID) and GSM network for the project to achieve its objectives.

RFID is a wireless technology that has an ability to identify, locate, track, and monitor people and object between the tag antennas and the reader. RFID reader obtains the information of objects and surrounding through communication with RFID tag antennas. These antenna and transceiver read the radio frequency and transfer the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the RF circuitry and information to be transmitted.[1]

So, for this project, the RFID tag will include temperature sensor on it and having a dedicated threshold value. Whenever temperature is exceeding the threshold value, it will be triggered and responding to the RFID reader. Then, RFID will send signal of the triggered location to the PC and alert the nurse. From here, GSM modem will take charge where nurse will send notifications via SMS to doctor's on duty.

1.2 Problem Statement

Malaria and typhoid fever patient suffers from fever spikes; where the body temperature rise and fall in a sudden. Patients of these two fevers need extra supportive care and the only physical sign that doctor can have from a suspected patient is fever. The fever is initially persistent. The doctor or nurse usually has to check the patient every four hours to take his/her temperature. When the temperature of the fever is around its peak (39-40°C), that is the time to take blood sample to check whether there are active parasite or bacterium that are related to malaria or typhoid. At that temperature, the patient is potentially become unconscious and the body may become over- hydration or under-hydration. So, nursing care is important at that time. The late and lack of treatment at that period of time may become life-threatening to the patient.

The main concern here is that the doctor cannot predict when the temperature of the patient exceeds its limit and the patient are all alone when his or her temperature is over the limit. So, by creating this new system, it will solve this problem where it can assure that the patient will receive the quickest treatment as alert will popup at the nurse's station and notifications via SMS will be send to the doctors on duty whenever the patient's body rises over its limit. Besides, the system will ease the nurse from attending to the patients to take their body's temperature because the ability of the system that may be adjusted to measure temperature at specified interval as required.

1.3 Objectives

The main objective of this project is to focus on application of RFID and GSM in medicine. The other objectives are to design a system that can;

- i- automatically measure body temperature for certain preset threshold value and record them into patient's database for monitoring purposes.
- ii- alert the nurse at her station and send SMS to the doctor whenever patient's core body temperature reach the peak of the fever (39°C).

1.4 Scope of Study

1.4.1 Analysis the symptom of Malaria and Typhoid fever

In developing this system, the author needs to understand theoretically and also the manual process involve at the hospital for these two types of fever. From here, the author will know about things and information needed to develop the system.

1.4.2 Perform analysis of RFID tag and reader suitable for the project

In designing the system, the author should know about the current manual set up work used in hospital nowadays. In designing this system, some criteria should be considered. The first one is the range of communication between the tag at the patient and the receiver at the nurse's station. The second one is the ability of the system to operate between the ranges of temperatures and detect the rise of the temperature from normal condition.

1.4.3 Built a suitable GUI with Visual Basic (VB) and database system with MySQL

A suitable database is needed besides the communication technologies used. Database with doctor's and patient's information must be clear and easy to retrieve by VB. Thus, GUI of the system need to be user friendly so that the nurse can easily adapt with this new system.

1.4.4 Test at the hospital

After developing the prototype, this system will be tested at hospital. From there, further integration and modification will be made to make the system runs smoothly.

1.5 Output of the system

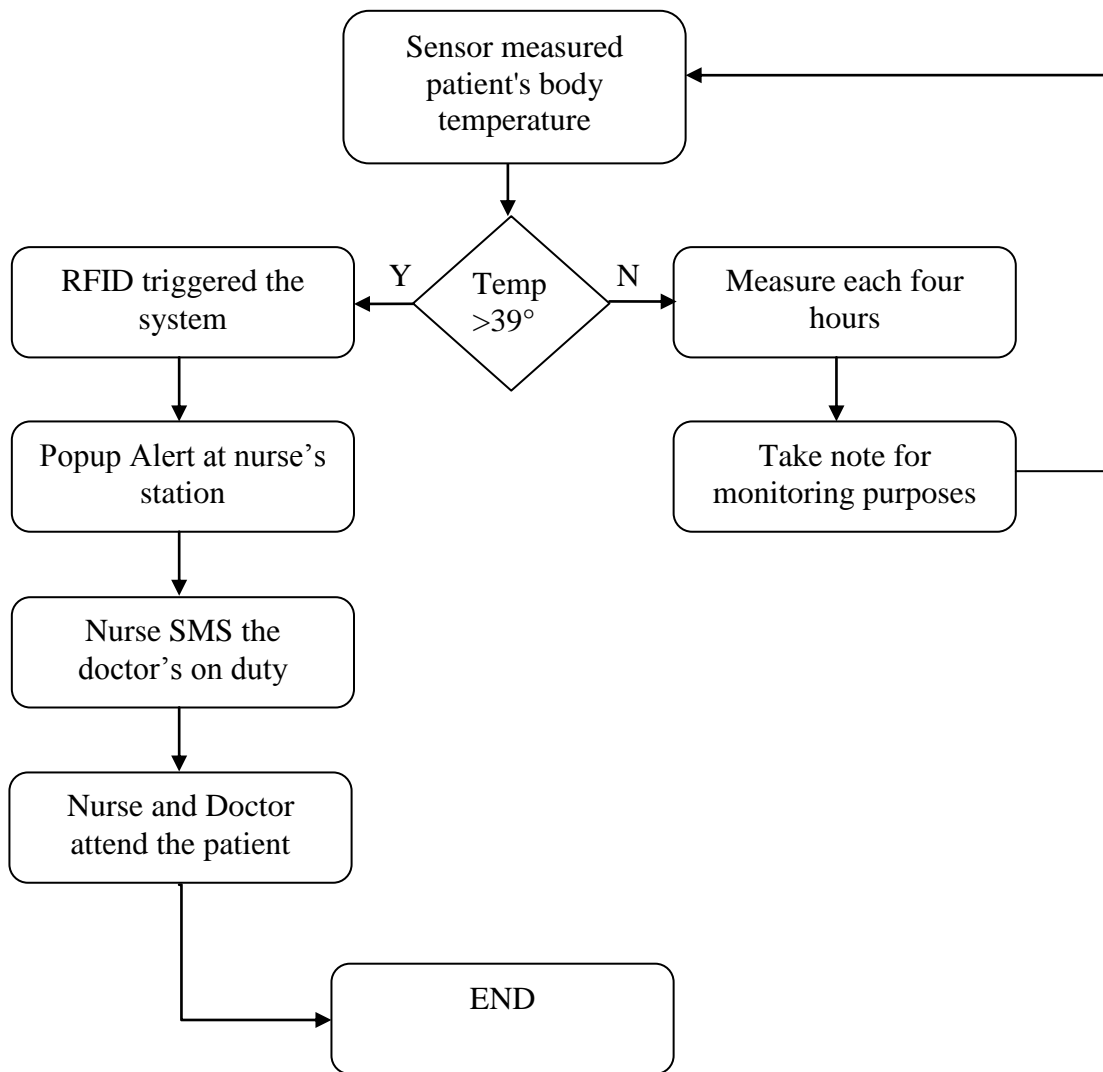


Figure 1: Flow of the System

CHAPTER 2

LITERATURE REVIEW

2.1 Malaria

What is malaria? Malaria is one of the planet's deadliest diseases and one of the leading causes of sickness and death in the developing world. It is a disease caused by a parasite called as *Plasmodium*, which infects red blood cells. There are four species of malaria; the serious type is *Plasmodium falciparum* malaria. It can be life-threatening. The other three species of malaria (*P. vivax*, *P. malariae*, and *P. ovale*) are generally less serious and are not life-threatening. [2]

How we can be infected by these parasites? The infection involves two hosts; humans and mosquitoes. The disease is transmitted to humans when an infected mosquito bites a person and injects the malaria parasites into the blood. This parasites travel through the bloodstream to the liver, multiply there and then infect the human red blood cells. [3]

Symptoms of malaria include fever as high as 39° to 40° C, headache, pains elsewhere in the body and also vomiting; usually appear between 10 and 15 days after the mosquito bite. On physical examination, fever is the only sign to detect malaria patient. If the doctor missed the physical sign and the patient is not treated, malaria can quickly become life-threatening by disrupting the blood supply to vital organs.[4]

According to the Ministry of Health Malaysia [5], the incidence rate (per 100 000 populations) of malaria as below:

Table 1 : Table of Malaria cases reported in Malaysia

Year	No of case
1999	25.90
2000	57.20
2001	53.22
2002	44.91
2003	25.28
2004	24.56
2005	21.31
2006	19.87

2.2 Typhoid

The second disease that we will discuss and research in the project is typhoid or also known as enteric fever. It is a serious infection that is caused by the bacterium *Salmonella typhi* (S. Typhi). [6] This bacterium only lives in humans.

How can a person get this disease or in other word, how the disease is transmitted? Anyone can get typhoid fever if they eat food or drink beverages that have been handled by a person who is shedding *S. Typhi* or if sewage contaminated with *S. Typhi* bacteria gets into the water used for drinking or washing food. [7]

Once *S. Typhi* bacteria are eaten or drunk, they multiply and spread into the bloodstream. The body reacts with sustain fever as high as 39° to 40° C and other signs and symptoms. The other sign and symptoms are; constipation or diarrhea, loss of appetite, rose-colored spots on the trunk, and an enlarged spleen and liver. Relapses are common. Symptoms are generally appearing one to three weeks after exposure.

According to the Ministry of Health Malaysia[5], the incidence rate (per 100 000 populations) of Typhoid as below:

Table 2 : Table of Typhoid cases reported in Malaysia

Year	No of case
1999	3.70
2000	3.40
2001	2.89
2002	3.48
2003	3.13
2004	1.93
2005	4.10
2006	0.77

2.3 Overview of RFID

For this project, RFID is one of the main technology that being used. RFID is the member of Automatic Identification and Data Capture (AIDC) technologies. It is fast and reliable means of identifying just about any material object. There are three basic components in RFID system, which are tags, readers, and antenna.

The tag contains at least two parts; Integrated Circuit (IC) and antenna. IC is for storing and processing information, modulating and demodulating a radio frequency (RF) signal while antenna is for receiving and transmitting the signal. There are two types of RFID systems, passive and active.

The reader is a device that provides network connectivity between tag data and interface. The reader is also known as an interrogator and it communicates with the RFID tags within its field of operation, performing any number of operations including simple continuous inventorying, filtering (searching for tags that meet certain criteria), writing to selected tags, etc.

Basically there are five differences in characteristics between active and passive RFID tags which are [11];

i. Differences in the Technical Characteristics

Active tag features two additional components compared to a passive tag that are, an on board power supply and on board electronics. The on board electronics consisting of sensors, microprocessors and I/O units are powered by the on board power which enables it to transmit the data to the reader on its own. With a continuous availability of tag power, the required signal strength from the reader to the tag is lower than what is required for a passive RFID tag. Also, the available signal strength is higher from a tag to a reader in an active tag.

On the other hand, Passive tags contain an integrated chip or circuit to absorb radio frequency waves from reader's signals and to send and receive data, low frequency or high frequency antenna and a plastic or mylar substrate which holds the pieces of the tag together. Since there is no battery, the power is supplied by the reader which draws the radio waves through the antenna forming a magnetic field. This allows the supply of the power to the tag which is restricted to the field of the reader.

ii. Communication Range

Passive RFID tags are constrained by the need for strong signals to power the tag and the small amount of power to respond to the reader, the communication range of a passive tag is limited to 3 meters or less. Active tags do not have the constraint of power and can thus transmit to as far as 100 meters or more.

iii. Data Storage

Active RFID tags have large read and write data storage almost 128 kilobytes and sophisticated data search and access capabilities while passive RFID, the data storage is less than 128 bytes with no search capabilities or data manipulation features.

RFID reader has anti-collision algorithms that permit simultaneous reading of large number of tagged objects while ensuring that each tag is read only once. RFID reader obtains the information of objects and surroundings through communication with RFID tag antennas.

The reader uses its antenna to send digital information encoded in a modulated waveform as well as the tone that the tag uses to power itself. A receiver circuit on the tag is able to detect the modulated field, decode the information, and use its own antenna to send (backscatter) a response. Readers may be fixed (dock door or shelf installations), mobile (installed on a forklift or hand-held), or in the form of a module contained within a printer/encoder.

An antenna converts electrical current into electromagnetic waves that are then radiated into space in a particular pattern at a given level of intensity. A linearly polarized antenna radiates entirely in one plane in the direction of signal propagation, while with a circularly polarized antenna, the plane of polarization rotates in a circular fashion (effectively a corkscrew when considered in time), making a complete revolution during one period of the wave. Below figures shows the basic configuration of reader and tag antenna in any RFID application [13] and RFID reader itself.

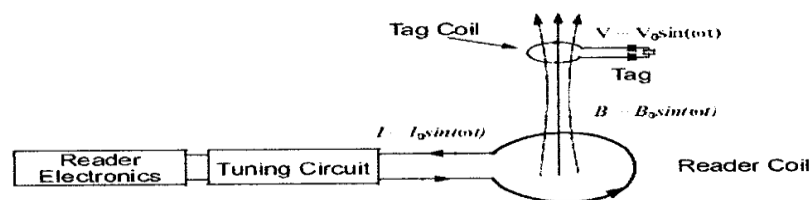


Figure 4: Basic Configuration of Reader and Tag Antenna in RFID Application.



Figure 5: RFID Reader

2.6 Operating Principles of RFID

2.6.1 Inductive Coupling

Inductive coupling means that the tag and the reader's antenna are coupled by the magnetic flux through both coils. Inductively coupled transponders are almost always operated passively where all the energy needed for the operation of the microchip has to be provided by the reader. For this purpose, the reader's antenna coil generates a strong, high frequency electro-magnetic field, which penetrates the cross-section of the coil area and the area around the coil. Electro-magnetic field may be treated as a simple magnetic alternating field with regard to the distance between transponder and antenna due to the wavelength of the frequency range used (< 135 kHz: 2400 m, 13.56 MHz: 22.1 m) is several times greater than the distance between the reader's antenna and the transponder.

This inductively coupled system is based upon a *transformer-type coupling* between the primary coil in the reader and the secondary coil in the transponder. This is true when the distance between the coils does not exceed 0.16 λ , so that the transponder is located in the *near field* of the transmitter antenna.[14]

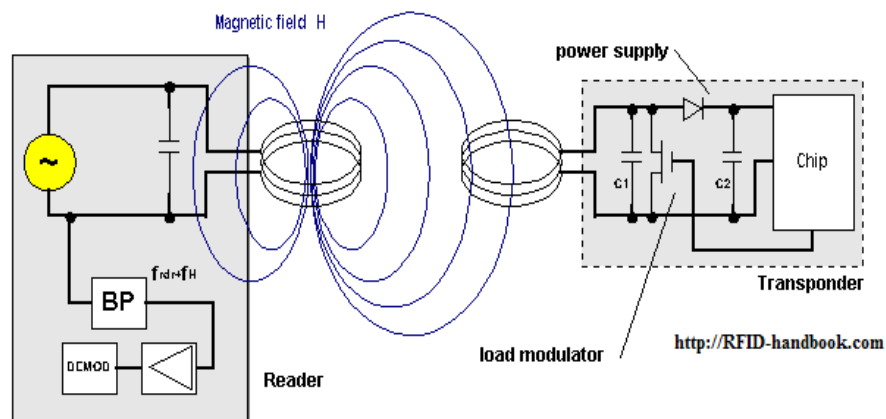


Figure 3: Operation Principle of Inductive Coupling

2.6.2 Backscatter Coupling

The electromagnetic waves from reader are reflected by objects with dimensions greater than around half the wavelength of the wave; in this case transponder. The efficiency with which an object reflects electromagnetic waves is described by its reflection cross-section. Objects that are in resonance with the wave front that hits them, as is the case for antenna at the appropriate frequency for example, have a particularly large reflection cross-section.

As in Figure 5 below, power P_1 is emitted from the reader's antenna, a small proportion of which (free space attenuation) reaches the transponder's antenna. The reflected signal travels into the antenna connection of the reader in the backwards direction and can be decoupled using directional coupler.

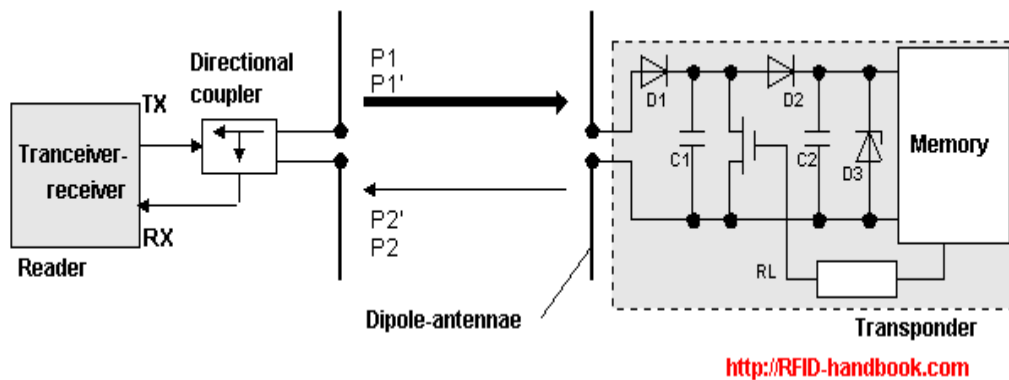


Figure 5: Operation Principle of a Backscatter Transponder

2.7 Operating Frequencies

RFID operates in unlicensed spectrum space, where its operating frequencies are refers to the size of the radio waves used to communicate between the RFID systems components. It is generally safe to assume that a higher frequency equates to a faster data transfer rate and longer read ranges, but also more sensitivity to environmental factors such as liquid and metal that can interfere with radio waves.

The operating frequencies are divided into several ranges or bands. With the exception of the lowest-frequency segment, each band represents an increase of frequency corresponding to an order of magnitude (power of 10). Table 3 depicts the eight bands in radio frequency spectrum, showing frequency and bandwidth ranges [15].

Table 3: Eight Bands in Radio Frequency Spectrum

Designation	Abbreviation	Frequencies	Free-space wavelength
Very Low Frequency	VLF	9kHz-30kHz	10km-100km
Low Frequency	LF	30kHz-300kHz	1km-10km
Medium Frequency	MF	300kHz-3MHz	100m-1km
High Frequency	HF	3MHz-30MHz	10m-100m
Very High Frequency	VHF	30MHz-300MHz	1m-10m
Ultra High Frequency	UHF	300MHz-3GHz	10cm-100cm
Super High Frequency	SHF	3GHz-30GHz	1cm-10cm
Extremely High Frequency	EHF	30GHz-300GHz	1mm-10mm

RFID systems currently operate in the Low Frequency (LF), High Frequency (HF) and Ultrahigh Frequency (UHF) bands. Each frequency has advantages and disadvantages relative to its capabilities. Table 4 shows a quick cross-section of the types of RFID technologies out there, their uses and their typical read ranges [16].

Table 4: RFID Frequencies, Uses and Typical Range

Frequency	Use	Pros and Cons	Range
125 kHz- 148 kHz Low Frequency (LF)			
Type: Passive	Animal Tracking, access control and Original Equipment Manufacturer (OEM) Applications	Signal negotiates liquids and metals fairly well. Higher tag cost due to long length solid copper antennas	½ to 4” is typical. 6” to 12” or maybe possible with specialized equipment.
13.56 MHz High Frequency (HF)			
Type: Passive	Anti-theft, document management, access control and OEM Applications	Antennas can be printed on substrate/labels, lowering tag costs. Serious interference from metals.	Can range from inches to several feet depending on reader hardware and tag type.
433 MHz (and 2.5 Ghz) Ultra High Frequency (UHF)			
Type: Active	Highway toll payment systems, vehicle management, asset tracking, etc.	Very long range. Very high tag cost. Uses battery, so tags have finite lifespan (typically 5 years)	Typically around 30 feet, but can range up to hundreds of feet.

2.8 Overview of GSM Modem

Global System for Mobile Communication (GSM) modem is a wireless modem that works with GSM network. Wireless modem behaves like a dial-up modem but the main difference between them is that dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The number of SMS messages that can be processed by a GSM modem per minute is very low, which is only about six to ten SMS messages per minute[17].

A GSM modem can be an external device or a PC Card / PCMCIA Card. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate. Computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards. With the AT commands, this modem can have a function as below;

- i. Read, write and delete SMS message
- ii. Send SMS messages
- iii. Monitor the signal strength
- iv. Monitor the charging status and level of battery
- v. Read, write and search phone book entries



Figure 6: GSM Modem

2.9 RFID Applications

2.9.1 *RFID temperature/ID tags could help spot bird flu [18]*

Company named, Digital Angel Corporation had introduce its patented 'Bio-Thermo' temperature-sensing, implantable RFID chip and identity system to international poultry/bird markets with an initial geographic emphasis in Asia - with a view to helping poultry breeders spot early signs of disease such as Avian Flu. This company for now has focused its implantable RFID temperature sensing system on the pets and horses.

The identity system includes the Bio-Thermo chips and related ID and temperature-sensing RFID scanners that aim to provide early identification of temperature increases in individual birds. With this, it may in turn help with the identification and control of outbreaks of avian diseases.

With early detection of temperature increases, identifying and controlling disease outbreaks become important; such monitoring could help farmers avoid the complete destruction of their stock by identifying, quarantining and monitoring suspected cases at an individual level.

Besides using it for the birds, this Bio-Thermo is also being used in pets. The chip will be put into the pet's body and be registered specifically to the owner. The benefit is that it can take accurate reading of the pet's core body temperature.

2.9.2 Application in monitoring and traceability of hemoderivates [19]

There is a system used by hospitals to secure and monitor the temperature of their blood bank. Whenever the temperature of the blood bank is over its limit, the system will send alarm for the hospital to take action. It is also used in blood bag that they wanted to be transfer to somewhere else. This system provides product quality assurance before the blood bags are used by discarding the ones that turn out to be defective because of insufficient conservation standards. So, the design of this new system is for hemoderivate product storage and production technology. In effect, this will avoid many blood transfusion risks.

2.9.3 Trailer temperature alert [20]

This temperature alert is mainly used in chilled or refrigerated trailer. It has an in-cab radio receiver incorporating a clear four digit LED display and temperature alert, linked to a temperature transmitter fitted within the trailer. The receiver is preprogrammed with 'acceptable temperature' parameters within the range -20°C to $+55^{\circ}\text{C}$. This temperature alert can therefore be used with both cold and warm produce.

Received temperature data outside the programmed parameters (typically 0°C - $+5^{\circ}\text{C}$) will activate the alert function and cause the display on the truck dashboard to flash on and off until the temperature returns within limits, when the unit will resume a steady display; or until the receiver is turned off. With this, the driver will alert with any changes and manage to take action when anything goes wrong with the temperature of their trailer.

2.9.4 RFID Pill Monitors Body Temperature [21]

Researchers in The Netherlands were able to monitor the body temperature by swallowed an RFID-based temperature sensor that measured their internal temperature. This will helped researchers identify potential health issues. This RFID technology has been used by volunteer participants at the world's largest marching event in the annual Four Days Marches of Nijmegen. With this pill, the researcher can monitor the marcher's core body temperatures so that they will not exceed recommended levels and prevent them from exhaustion or overheating.

Using complex event processing (CEP) technology, researchers were able to monitor and record the temperatures via a signal transmitted every ten seconds from the RFID "pill" to a receiving device in the volunteer's backpack. That data was then transmitted via Bluetooth to a GPS-enabled mobile phone to the operations center handled by the researcher themselves.

CEP is an event processing technology that allows an application to analyze multiple streams of event data, and then react to those conditions quickly. The CEP platform processed and analyzed the temperature data in real time. If a volunteer's body temperature was too high, officials could alert them to either rest or rehydrate using SMS text messaging, calling them on the mobile phone, or by alerting the onsite medical team to take action if needed.

CHAPTER 3

METHODOLOGY

3.1 Procedure Identification

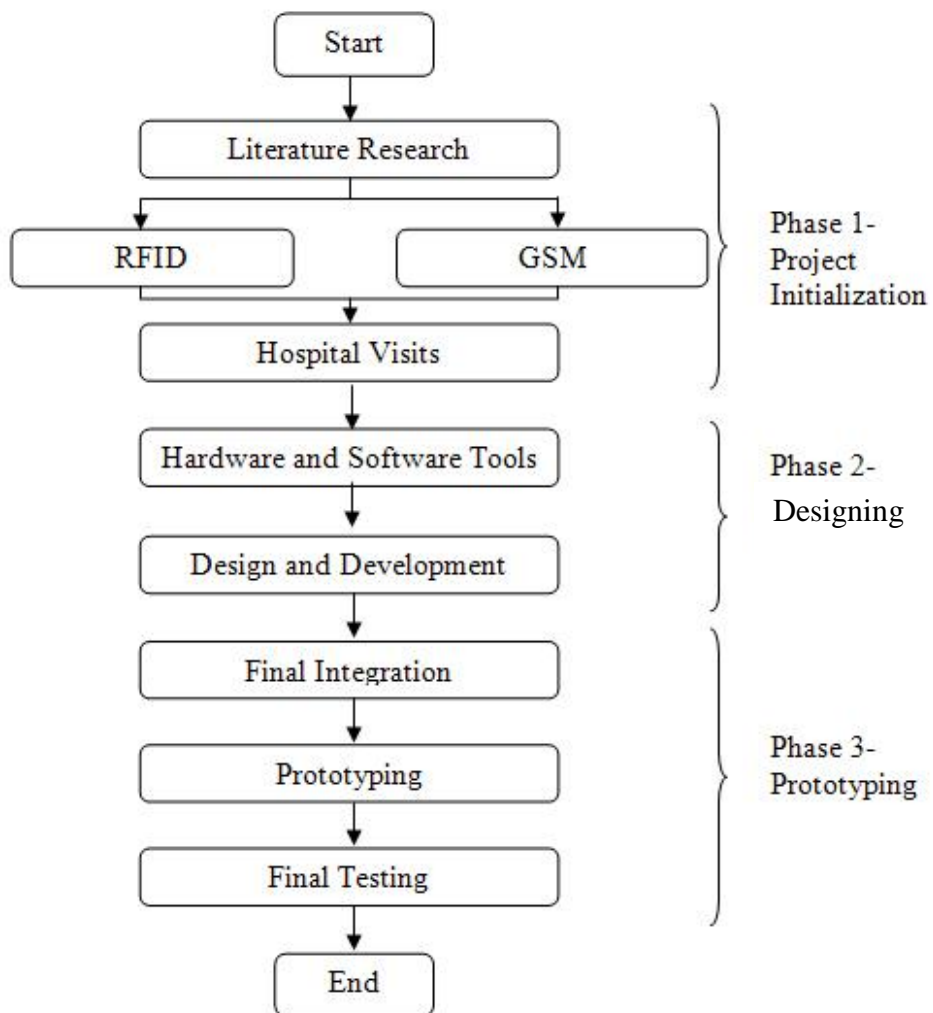


Figure 7 : Flow Chart

3.1.1 Phase one (Project Initialization)

Phase 1 is the early stage of the project development. Firm planning and understanding of the project is a must so that the project will be smoothly done. The understanding of the project is including the research on the technology that wants to be used that are RFID and GSM network.

Target hospital that will be implemented for this prototype is Hospital Sungai Buloh. The pioneer of this project; Mohamad Syukri Effendy has done this visit. The visit has given him the opportunity to meet the director of Hospital Sungai Buloh for professional opinion about the project and lots of advice given to see the project succeeded. This eventually will benefit the author as the successor for the project.

3.1.2 Phase two (Designing)

Phase 2 is where the designing the layout and the process of the system will be done. Choosing the right hardware to be used and development of the software and the database must be ready within this phase. Researchers have been made for the hardware and software needed for the project. The hardware needed are RFID Active Tag Temperature Sensor, RFID reader, and GSM Modem.

3.1.3 Phase Three (Prototyping)

Last but not least is phase 3, the beginning of the fabrication for the prototype. The integration will be focusing on the interfacing between devices, hardware and system of the project. In final testing stage, the project should been tested for its completion after the prototype finished with the combining of all of the hardware and the software application. The final testing will be made by replacing actual Malaria and Typhoid fever patient with a device that can control temperature. This stage is to make sure that the system functions well before the actual testing will be done at Hospital Sungai Buloh.

3.2 Project Overview

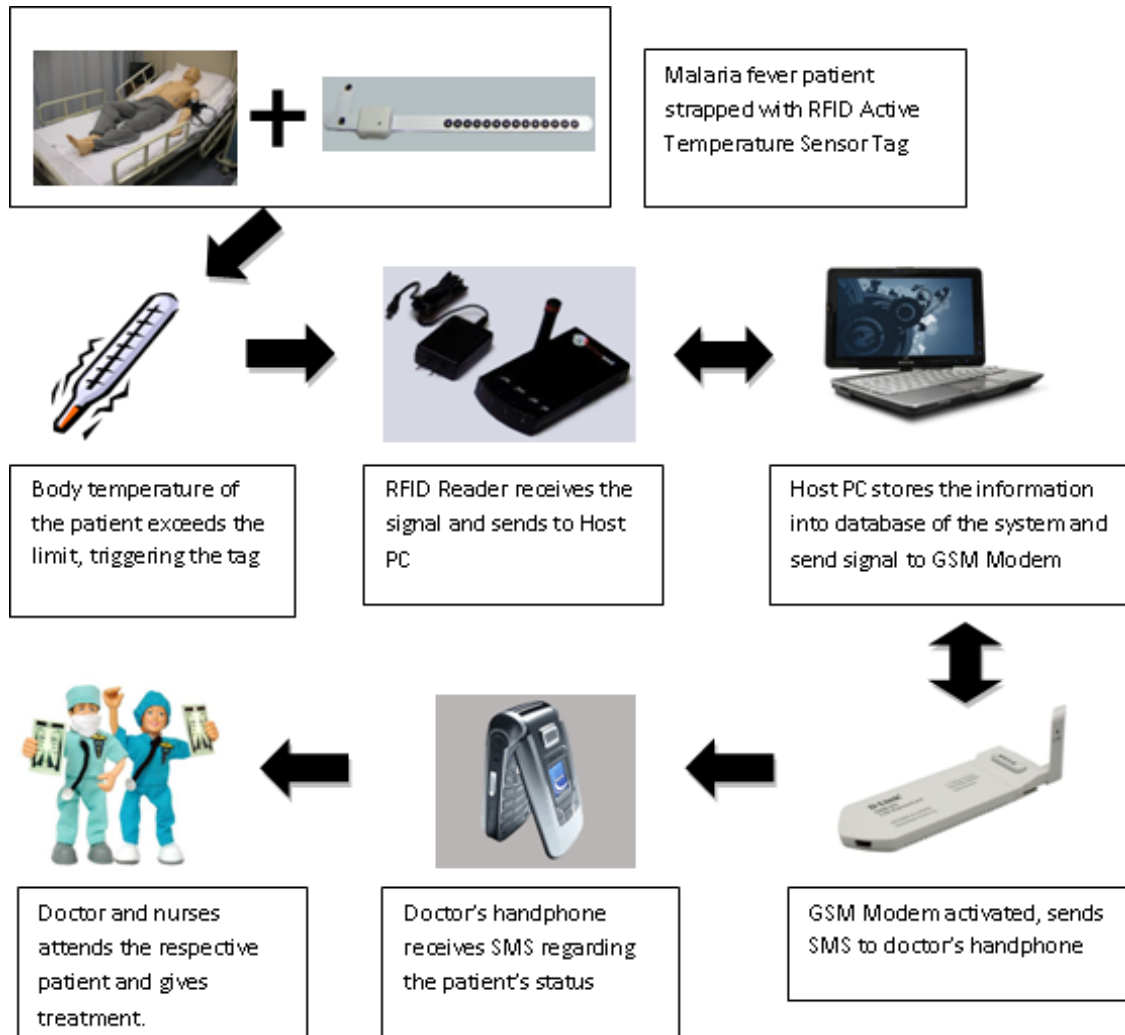


Figure 8: Project Overview

Patient will be strapped with the tag at his/her armpit to determine the body temperature. The limit for the temperature to exceed is 39°C . Once the system triggered, the tag will send signal to the reader attached with the Host PC. Then Host PC will trigger alarm on it for nurses to be alert and send signal to GSM Modem for it to be activated. SMS will be sent to doctor's hand phone for him to be notified regarding the patient's status. The patient will be then receiving treatment from both of the nurses and doctor.

3.3 RFID Hardware and Specification

For this project, there are two most important things needed. They are RFID Active Tag Temperature Sensor and RFID reader.

Although active RFID need a power source compared to passive and semi-passive RFID tags, it can store much bigger data and information. It also can broadcast response signal to the reader. This active tag is typically more reliable as there are only fewer errors than passive tags due to the ability for it to conduct 'session' with the reader. The Active Tag Temperature Sensor used for this project has characteristics as below;

- i. Long communication range
- ii. Having the capability of initiating communications (e.g. communicate with the reader each time patient having more than 39°C)
- iii. Having the capability to perform independent monitoring and control (e.g. monitor temperature of the patient each 4 hours)
- iv. Need battery power to function, which limit the lifetime and affect the cost for long-term maintenance.
- v. The tag can stand a harsh environment
- vi. Capable of perform independent monitoring and control

Second thing needed is RFID reader that used to interrogate an RFID tag. Readers communicate to the Host computer via an RS-232 cable or via an Ethernet network connection. Readers are used to read the tags and transmit the received data to the Host computer. Readers also used to enable, disable, wake up and program the tags. It has an antenna that emits radio waves while the tag responds by sending back its data. As in Figure 9, we can see that the RFID reader will use two frequencies that are 916.5 MHz and 433 MHz for transmitting and receiving signal. This is to avoid clashing of transmitting and receiving data from the tags. RFID reader for this project will be in beacon mode. Beacon mode is where the reader allowed the tag to continuously send the data to them in certain period minutes and place into the database.

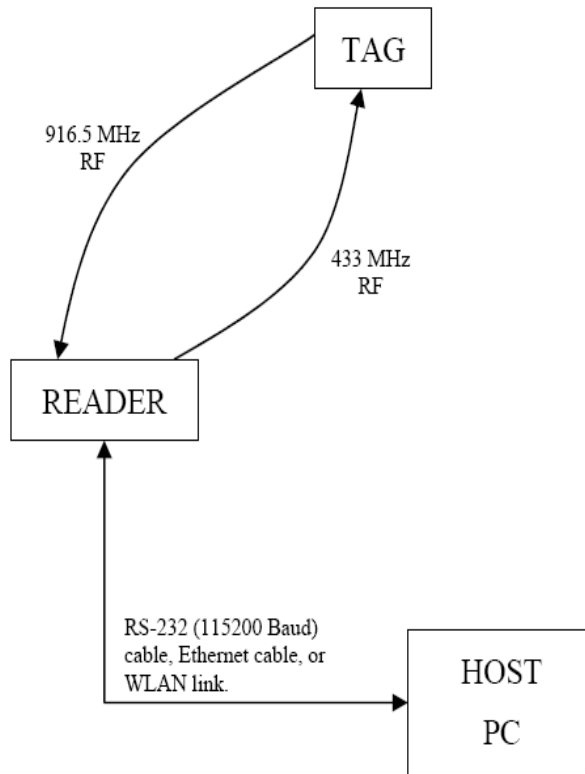


Figure 9: System flow for ActiveWave hardware used

Active Wave RFID reader field strength can be configured by ranging from 0 to 20. So, we can estimate the RF field from setting the strength ratio as shown in table 5 below.

Table 5: Setting ActiveWave Reader field strength ratio corresponds to estimated distance

Field Strength Ratio	Estimated Distance (m)	Field Strength Ratio	Estimated Distance (m)
1	4.25	11	46.75
2	8.50	12	51.00
3	12.75	13	55.25
4	17.00	14	59.50
5	21.25	15	63.75
6	25.50	16	68.00
7	29.75	17	72.25
8	34.00	18	76.50
9	38.25	19	80.75
10	42.50	20	85.00



Figure 10 : Active Wave RFID Kit

Figure 10 shows the hardware tools that will be used for this project; manufactured by Active Wave.

RFID Kit Components:

- I. 1 Active Wave Reader and Power Supply
- II. 1 Active Wave RJ-45 Cable
- III. 6 Active Wave Wristband Tags with Temperature Sensor
- IV. 1 Programming Station Software Application

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Interface

4.1.1 Interface for System Login and Main Menu

The first step, user such as the nurse or doctors needs to login their username and password as in Figure 11 below. After the users succeed with the 'Login', 'Main Menu' will come up as Figure 12. 'Start' button must be clicked to start the program and switch the program on. Then, the user can choose to click either 'System Administration' to register a new user of the system or new patient, or 'Patient Record' to view specific patient with their temperature body.

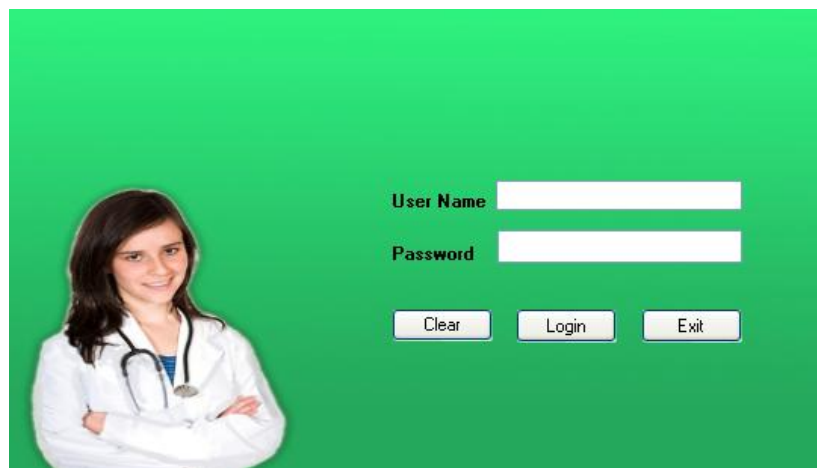


Figure 11: Login Menu



Figure 12: Main Menu

4.1.2 *Interface for Administration*

For administrator to register new patient or new user for the system, they just have to click 'System Administration' in Main Menu. This can be seen as in Figure 13. If they click on 'Add User', interface as in Figure 14 will come out while Figure 15 will come out if they click 'Add Patient'. They just need to complete the form and click 'Register' and then all of the information will be kept in database of the system.



Figure 13: Administration Menu

Add Administrator

Name

ID Number

Position

Username

Pasword

Figure 14: New User Registration Menu

Patient Registration

Patient Name

I.C. Number

Diagnosis

Date of Birth

Temperature

Tag ID

Age

Figure 15: New Patient Registration Menu

If the doctors or admin want to register a new patient and using a tag ID that has been used before, they need to delete previous patient's information that use corresponding tag ID before proceed to register the new patient. This can be done by clicking 'Delete Patient Record' as in Figure 13 and enter corresponding tag ID that want to delete. The previous patient's information will be moved to archive database and corresponding tag ID can be use to register the new patient.

Figure 15 shows the patient registration page for ‘Add Patient’ section from previous administration page. The information required will include the patient’s name, i/c no, diagnosis of disease, date of birth, temperature on admission, patient tag ID that and age. The submit section is where the information will be stored at the database of the system as shown in Figure 16.

Show : 30 row(s) starting from record # 0 in horizontal mode and repeat headers after 100 cells Sort by key: None Go									
	name	ic_num	tagid_patid	dateofbirth	dateofadmin	diagnosis	temperature	timeofadmin	age
<input type="checkbox"/>	Aurangzeb	880828-05-2859	204	1988-08-28 23:03:58	2009-06-01 23:04:13	malaria	35	2009-06-01 23:04:37	17
<input type="checkbox"/>	Abu b. Ali	800101-23-4059	201	1980-01-01 12:23:23	2009-06-04 12:24:50	malaria	38	2009-06-04 12:24:50	24

Check All / Uncheck All With selected:

Show : 30 row(s) starting from record # 0

Figure 16: Database for New Patient Registration section

4.1.3 Interface for Patient Record

When the nurse or doctor want to gather about their patient’s information, they just have to click on ‘Patient Record’ on the ‘Main Menu’ and figure as in Figure 17 will come out. From here, they can decide either they want to retrieve previous patient’s record or view current patient’s record. They just have to click either button as in Figure 17 and then enter patient ID and click ‘Confirm Details’ as in Figure 18. The patient’s information will be gathered from related database and came out for the doctor to analyze the trend of the patient’s temperature.



Figure 17: Patients Record

Patient Records

Enter patient ID

Patient Name Patient's Age
 Diagnosis Date of Birth
 Date of Admission IC Number

Temperature	Date	Time
39.25	2009-10-04	18:03:53
38.625	2009-10-04	18:02:51
38.625	2009-10-04	18:02:47
37.25	2009-10-04	18:01:20
37.25	2009-10-04	18:01:17
36	2009-10-04	18:00:18
36	2009-10-04	18:00:16
36	2009-10-04	18:00:15
36	2009-10-04	18:00:15
36	2009-10-04	18:00:14
34	2009-10-04	17:59:13
34	2009-10-04	17:59:11
34	2009-10-04	17:59:08
30.5	2009-10-04	17:57:13
34	2009-10-04	17:59:09
30.5	2009-10-04	17:57:12
30.5	2009-10-04	17:53:41
26	2009-10-01	13:58:32

Figure 18: Example of Patient Record

4.1.4 Interface between Database and GSM Modem

Whenever there is an alert about any patient who reached high body temperature, the popup as in Figure 19 below will come out. After the nurse notify with it and they click 'Ok' button, they need to click another icon at the desktop named 'SMS Alert'. The interface for this 'SMS Alert' is as in Figure 20. The nurse just has to fill the doctor's ID no and patient's tag no as indicate in popup (Figure 19) and click 'Check'. Once they did that, the interface will interact with the database and fill in the doctor's name, doctor's telephone number and patient's information and send the message once the nurse click 'SMS Doc'.



Figure 19: Alert Form

Figure 20: SMS Alert Form

4.2 Demo in front of Sg. Buloh Hospital's Director.

On 17th of September, the author and supervisor of this project, Ms. Hanita have made an appointment with Director of Hospital Sg. Buloh, Dr. Khalid Ibrahim. This appointment is made to have the first demo of the system and get feedback from him. Few feedbacks and information have been clarified further by him especially about the need of the system for Malaria and Typhoid fever patients. As being stated by Dr. Khalid, the bacterium of the fever is high when the body temperature is at its peak (39-40°C), and that is the time to take blood sample to check whether there are active parasite or bacterium that related to malaria or typhoid. So, this system has eased the doctor and nurse from checking the pattern of the patient's body temperature manually to have the diagnosis of the fever.



Figure 21: Author with Project Supervisor at Hospital Sg. Buloh

4.3 Testing the Device

4.3.1 Range between each tag and reader

This test needs to be done to check if any interference happened between each tag and reader that affects the efficiency of the system to send and receive the signal. If interference happened, it can defect the system where maybe the tag cannot send the signal to the reader although it has been triggered by the temperature of patient's body. The distance range from reader and the tag must also be tested to check for their capabilities of communicating with each other although at a long distance.

4.3.2 User friendly interface

The system has been tested and demonstrated in front of few people just to get their opinion about the interface and adaptability of the system. It must be easy to use and user friendly.

4.3.3 Error percentage of the system

After done with lab test and hospital test for the system, it must be check for its error percentage. This is vital to reconfigure the system to have the right configuration time so that the alert popup when the core body's temperature of the fever patient is at its peak. The formula to check the error percentage is as below;

$$\text{Error \%} = \left[\frac{\text{Theoretical temperature} - \text{Real temperature reading}}{\text{Theoretical temperature}} \right] \times 100$$

4.4 Lab Test

The objectives of lab testing are to show that the system is working in the range of fever temperature (within 36 to 40°C) and also to check for tag's sensitivity, accuracy and performance. For the test, we have used temperature controller which is magnetic stirrer to control the tag's temperature. Below is the result for the lab test;

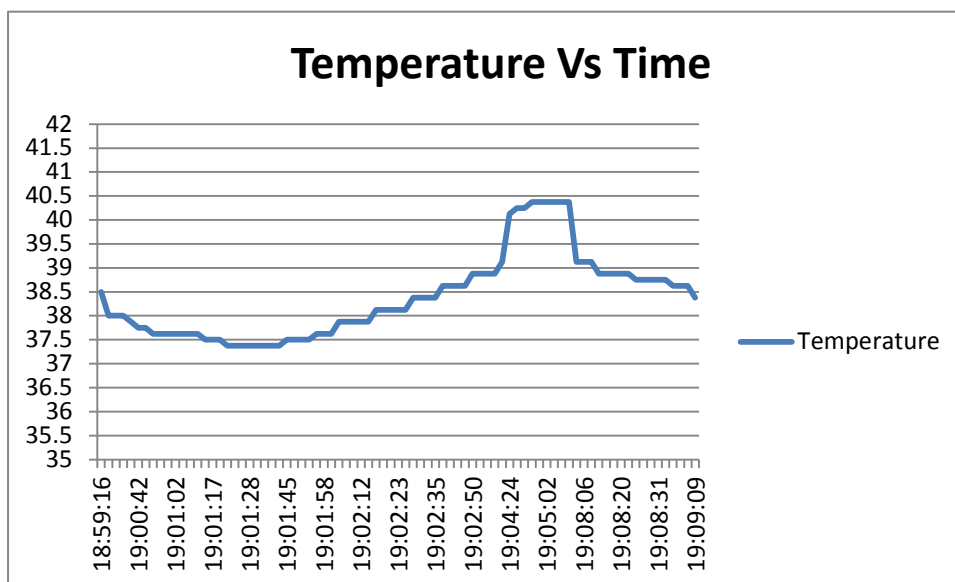


Figure 22: Temperature vs. time for lab testing

As we can see in the graph above, the system is perfectly working in the temperature range needed to check for the fever patients. Besides, the system is quite sensitive to any changes of the temperature where it can detect the changes within seconds.

4.5 Hospital Tests

Hospital testing has been done with objectives of checking the accuracy, reliability, radius of the system's RFID reader and tag and also check for any error of the system. This test has been done on 23rd and 24th of November 2009 and involved two patients from Hospital Sg. Buloh.

4.5.1 Patient 1

For first testing, we have an Indonesian patient named Adnan Rustandik, age 19. Result for the test on patient 1 is as below;

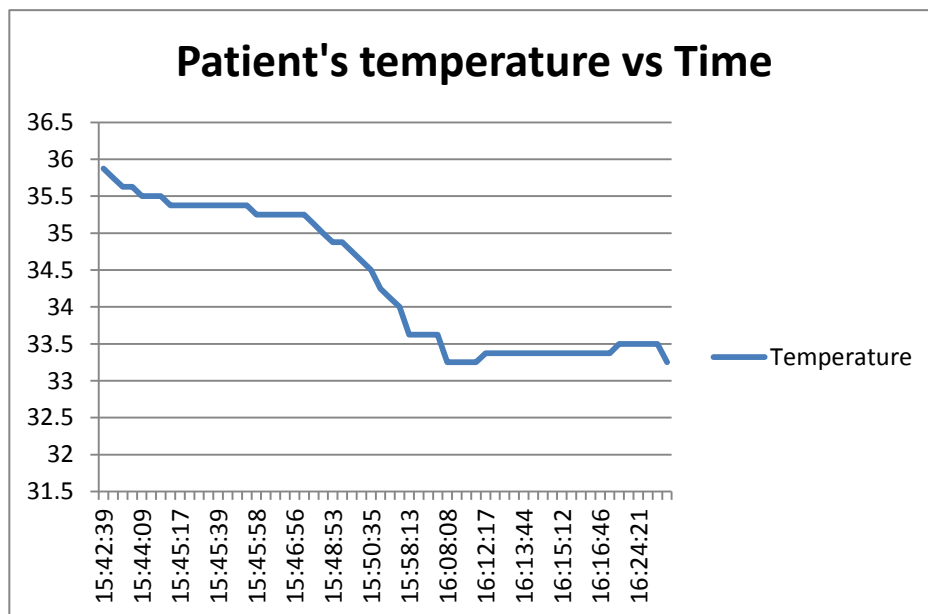


Figure 23: Patient's 1 Temperature vs. Time

As shown in the figure above, the patient has quite a high fever but after 5 minutes, his body temperature decreased. This is due to his doctor's action to inject intravenous (iv) fluid into his body. After iv fluid fully inserted into the patient's body, his temperature become stable around 33.5°C.

4.5.2 Patient 2

For first testing, we have an Indonesian patient named Hary Urtiadi, age 31. His body's temperature is as shown as figure below.

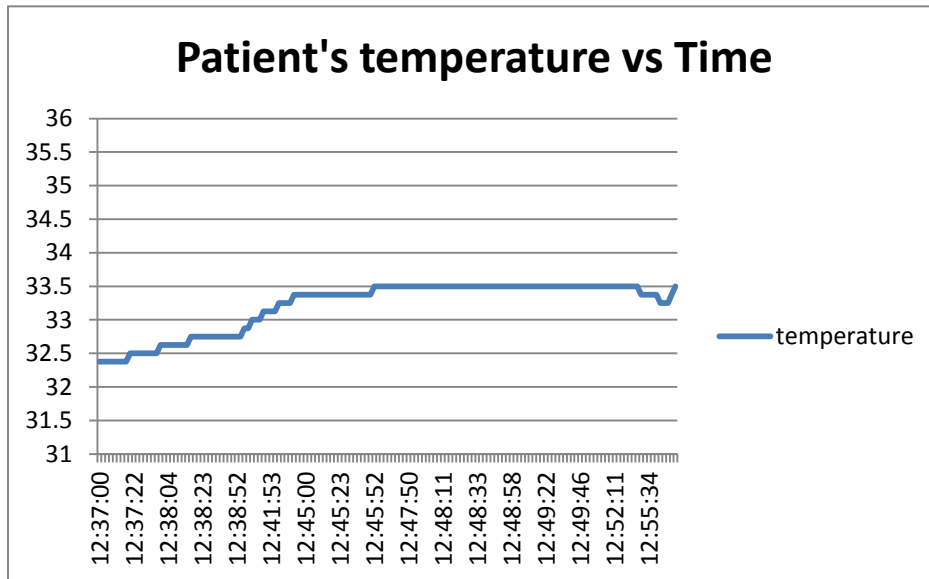


Figure 24: Patient's 2 Temperature vs. Time

As shown in the figure above, although the patient is suspected with Malaria fever, his body temperature is already stable due the fact that his doctor has already treated him with appropriate medicine. So, he has a stable temperature around 33.5°C. The temperature is lower than average at the first three minutes just because of the ambient room temperature that is quite low due to the air-conditioner in the ward. After the tag getting used with the patient's armpit, the tag's temperature shows according to the core body temperature of the patient.

4.6 Test Result

After done with hospital tests and lab test, the system has been proved that it can cover around five to seven meters radius from the RFID reader and its tag. From the data gathered, we know that there are errors in measuring patient's body temperature. The factor that effects the measurement depends on where the tag is placed on the body of the patient. As in this case, the tag is being put at the armpit of the patient. Normal temperature in the mouth is around 37°C while normal temperature on the armpit is around 36°C. So, there is one degree Celsius different between normal temperatures in the mouth and on the armpit.

The average temperature taken from the hospital tests is around 33.5°C. This average can be taken as a normal temperature of the core body temperature of a patient. So, from data that we have, the error for this system can be calculated as below;

$$\begin{aligned}\text{Error \%} &= \left[\frac{\text{Theoretical temperature} - \text{Real temperature reading}}{\text{Theoretical temperature}} \right] \times 100 \\ &= \left[\frac{36^\circ\text{C} - 33.5^\circ\text{C}}{36^\circ\text{C}} \right] \times 100\% \\ &= 6.94\%\end{aligned}$$

The error is around 7%. So, we need to reconfigure the system to have the threshold value to have 7% less than its theoretical value. As for the system, if the peak threshold of core body temperature on the armpit of a fever patient is around 38°C, we need to change it around 35.5 °C for the alert to popup.

In order to improve the test result, the system needs to be tested on more patients. With a lot more tests, the system can have more accurate error percentage by analyzing and calculate from all data gathered.

4.7 Challenges faced

4.7.1 Building a source code for the system

This system has a quite complicated source code. This becomes a challenge to the author as the author only having the basic knowledge of the VB language. The author has to do a lot of research about VB and ask for help and support from VB users. Below is the flow diagram of the system before the source code is built accordingly.

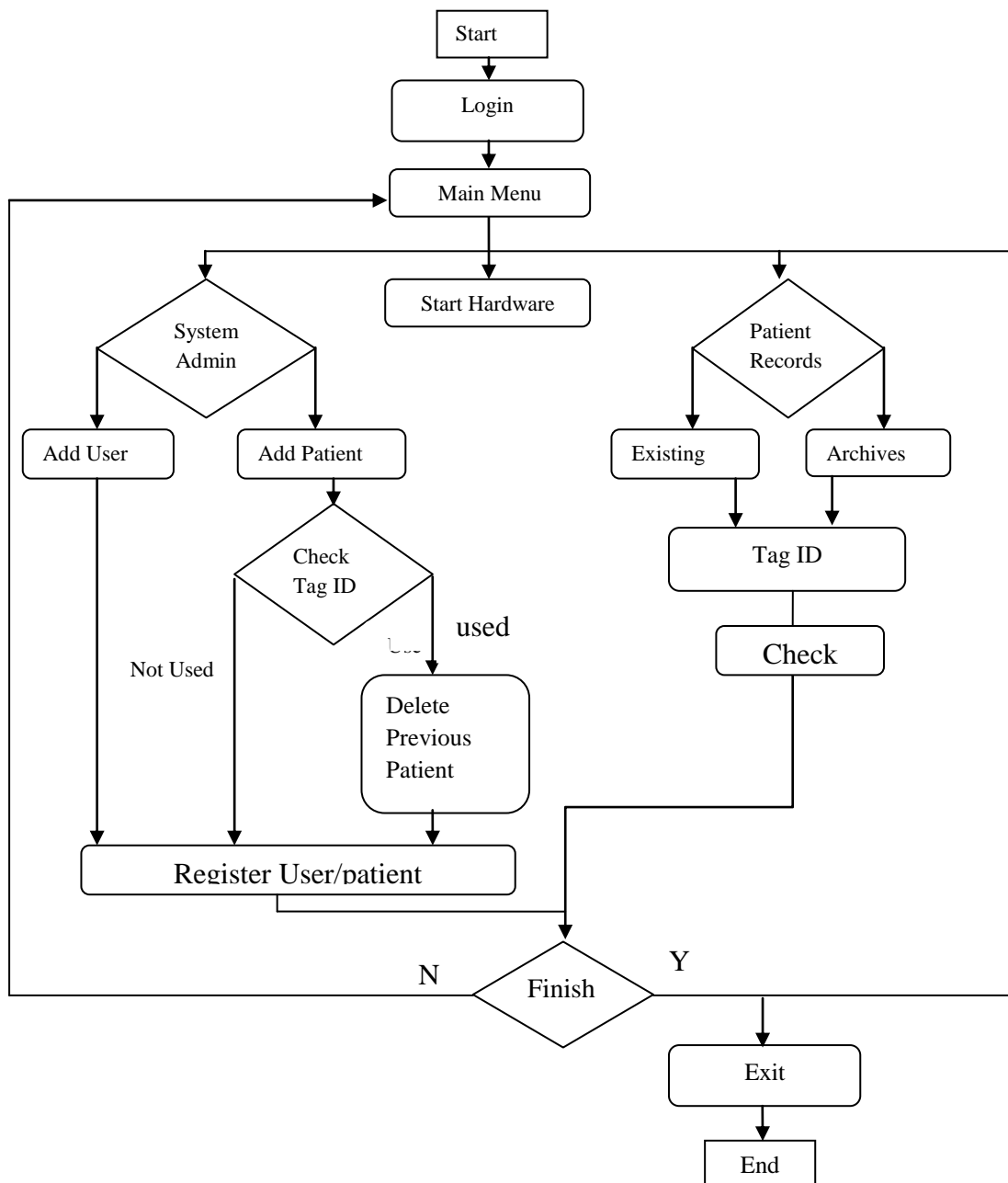


Figure 25: Flow diagram of the system

4.7.2 *Building the database for the system*

One of the other challenges for the author to build up this system is to construct database system. Databases for this system is quite complicated where there are five databases shown as below;

- Temperature database
- Admin database
- Current patient database
- Archive patient database
- Archive database

Archive database is needed to connect the entire related patient's name with the corresponding patient's tag ID. It is important to have a correct connection of specific tag ID with specific patient's info to retrieve archive database.

All of these databases are important to make sure this system can run smoothly. A lot of try error and research has been done to make sure that the database is complete with all of the data needed for the system to functioning well. Databases of the system are shown as in Appendix A.

4.7.3 *Integration between RFID hardware and GSM modem*

In the first planning, GSM modem is part of the system where whenever the patient's core body is above 39°C, the system will trigger the GSM modem to straight away send the SMS the doctor who is on duty. The problem that happened is that GSM and RFID cannot be integrated together trough Visual Basic (VB). The solution that has been done is that the system for temperature tracking is separated with the SMS alert although both of the system used the same database.

Now, whenever the alert popup from the temperature tracking system, the nurses have to click 'SMS Alert' icon and insert patient's tag ID and ID for the doctor who is in charge at that moment before they can send the SMS.

4.7.4 *Hardware Reliability*

Active Wave RFID kit having the reliability issues such as battery of the tags only last for about two to three months and the distance range between the tags and reader is quite low than what it supposed to be. Issue of the battery has increased the cost of the system in a long term especially in maintenance cost.

The solution that applicable is the tag will take measurement of patient's body temperature once every four hours as suggested by doctor and not by every few seconds as this prototype has made it. While regarding the distance range covered by single reader, the placement of it needs to be taking into account when implementing the system. As in this case, the reader must be put at a higher place and at the centre of the room so that the radius for the reader to detect any tags surrounding it will be increased.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

As far as this project concern, we can conclude that for the lab test, result shows that the system can perfectly working in range of temperature needed (36-40°C) and sensitive to temperature changes while result for hospital tests shows that there is an error in measurement around 7%, but the system need to be tested on more patient to make the error percentage to be more accurate.

Besides, we also can conclude that this system is essential for the doctors and nurses in detecting and serve the Typhoid and Malaria patient well where it can measure and monitor the body temperature of the patient. The system can alert the nurse at their station and notify via SMS to the doctor definitely a good feature that can reduce the possibilities of fatal that can happen to the patient.

5.2 Recommendations

There are few of recommendations that can be done to improve this system better. They are as follows;

- The system can also be done to other type of fever or any temperature related disease such as dengue and cikunguya fever. This will benefit more people in wider cases of fever.
- Implementation of other RFID sensor than not only detects body temperature but also other necessary information such as blood pressure. This absolutely helps the doctor and nurses to act faster and more efficient.

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APPENDICES

APPENDIX A
Database Table

phpMyAdmin Server: localhost Database: hospital_db Table: temprack

Database: hospital_db (5)

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> tagID	varchar(6)	latin1_general_ci		No			
<input type="checkbox"/> name	varchar(30)	latin1_general_ci		No			
<input type="checkbox"/> temperature	varchar(6)	latin1_general_ci		No			
<input type="checkbox"/> time	datetime			No	0001-01-01 12:00:00		

Check All / Uncheck All With selected:

Print view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After tagID Go

Show: 30 row(s) starting from record # 30

in horizontal mode and repeat headers after 100 cells

	tagID	name	temperature	time
<input type="checkbox"/>	203	True	34.625	2009-11-30 17:12:33
<input type="checkbox"/>	201	True	25.375	2009-11-30 17:12:19
<input type="checkbox"/>	203	True	34.625	2009-11-30 17:12:12
<input type="checkbox"/>	201	True	25.375	2009-11-30 17:11:58
<input type="checkbox"/>	203	True	34.625	2009-11-30 17:11:48
<input type="checkbox"/>	203	True	34.625	2009-11-30 17:11:16
<input type="checkbox"/>	203	True	34.5	2009-11-30 17:10:51
<input type="checkbox"/>	203	True	34.5	2009-11-30 17:10:29
<input type="checkbox"/>	203	True	34.5	2009-11-30 17:10:08
<input type="checkbox"/>	203	True	34.375	2009-11-30 17:09:47
<input type="checkbox"/>	203	True	34.375	2009-11-30 17:09:19
<input type="checkbox"/>	203	True	34.375	2009-11-30 17:08:58
<input type="checkbox"/>	203	True	34.375	2009-11-30 17:08:37
<input type="checkbox"/>	201	True	26.75	2009-11-30 17:08:10
<input type="checkbox"/>	203	True	34.375	2009-11-30 17:08:08
<input type="checkbox"/>	203	True	34.375	2009-11-30 17:07:47
<input type="checkbox"/>	201	True	27.125	2009-11-30 17:07:38

phpMyAdmin Server: localhost Database: hospital_db Table: registration

Database: hospital_db (5)

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> ID	varchar(30)	latin1_general_ci		No			
<input type="checkbox"/> Post	varchar(30)	latin1_general_ci		No			
<input type="checkbox"/> user_name	varchar(30)	latin1_general_ci		No			
<input type="checkbox"/> password	varchar(30)	latin1_general_ci		No			
<input type="checkbox"/> name	varchar(30)	latin1_general_ci		No			
<input type="checkbox"/> DoctorHP	varchar(15)	latin1_general_ci		Yes	000 0000000		

Check All / Uncheck All With selected:

Print view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After ID Go

Query results operations

Print view Print view (with full texts) Export

Show: 30 row(s) starting from record # 0

in horizontal mode and repeat headers after 100 cells

Sort by key: None Go

	ID	Post	user_name	password	name	DoctorHP
<input type="checkbox"/>			doctor	123		000 0000000
<input type="checkbox"/>	doctor1	Doctor	dr. shariffudin	123	shariffudin	0195262206

Check All / Uncheck All With selected:

Show: 30 row(s) starting from record # 0

in horizontal mode and repeat headers after 100 cells

phpMyAdmin Server: localhost Database: hospital_db Table: patint_details

Database: hospital_db (5)

hospital_db (5)

- archives
- archive_names
- patint_details
- registration
- temptrack

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	name	varchar(50)	latin1_general_ci	No			
<input type="checkbox"/>	ic_num	varchar(15)	latin1_general_ci	No			
<input type="checkbox"/>	tagid_patid	varchar(15)	latin1_general_ci	No			
<input type="checkbox"/>	dateofbirth	datetime		No			
<input type="checkbox"/>	dateofadmin	datetime		No			
<input type="checkbox"/>	diagnosis	varchar(20)	latin1_general_ci	No			
<input type="checkbox"/>	temperature	int(11)		No			
<input type="checkbox"/>	age	int(11)		No			

Check All / Uncheck All With selected:

Print view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After name Go

Show: 30 row(s) starting from record # 0

in horizontal mode and repeat headers after 100 cells

Sort by key: None Go

	name	ic_num	tagid_patid	dateofbirth	dateofadmin	diagnosis	temperature	age
<input type="checkbox"/>	Tadiwa	12341324	200	1990-12-12 00:00:00	2009-11-22 15:54:19	Malaria	34	23
<input type="checkbox"/>	ili	1234	201	2009-12-24 00:00:00	2009-11-24 12:50:21	distance testing	35	2
<input type="checkbox"/>	Hary Urliadi	indon1234	203	1976-08-15 00:00:00	2009-11-24 12:38:32	Malaria	37	31
<input type="checkbox"/>	pudin	12345	205	1990-11-23 00:00:00	2009-11-23 15:50:04	tstng distance	37	19

Check All / Uncheck All With selected:

Show: 30 row(s) starting from record # 0

in horizontal mode and repeat headers after 100 cells

phpMyAdmin Server: localhost Database: hospital_db Table: archive_names

Database: hospital_db (5)

hospital_db (5)

- archives
- archive_names
- patint_details
- registration
- temptrack

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	name	varchar(65)	latin1_general_ci	Yes	NULL		
<input type="checkbox"/>	ic_num	varchar(15)	latin1_general_ci	Yes	NULL		
<input type="checkbox"/>	tagid	int(11)		Yes	NULL		
<input type="checkbox"/>	dateofbirth	datetime		Yes	NULL		
<input type="checkbox"/>	dateofadmin	datetime		Yes	NULL		
<input type="checkbox"/>	diagnosis	varchar(45)	latin1_general_ci	Yes	NULL		
<input type="checkbox"/>	temperature	int(11)		Yes	NULL		
<input type="checkbox"/>	age	int(11)		Yes	NULL		
<input type="checkbox"/>	count	int(11)		No		auto_increment	

Check All / Uncheck All With selected:

Print view Propose table structure

Add 1 field(s) At End of Table At Beginning of Table After name Go

Show: 30 row(s) starting from record # 0

in horizontal mode and repeat headers after 100 cells

Sort by key: None Go

	name	ic_num	tagid	dateofbirth	dateofadmin	diagnosis	temperature	age	count
<input type="checkbox"/>	Tadiwa	12341324	200	1990-12-12 00:00:00	2009-11-22 15:54:19	Malaria	34	23	1
<input type="checkbox"/>	john	0128390821	201	1990-12-12 00:00:00	2009-11-23 12:38:26	malaria	37	19	2
<input type="checkbox"/>	Adnan Rustandik	indon123	203	1990-11-23 00:00:00	2009-11-23 15:43:39	denggi	37	19	3
<input type="checkbox"/>	Adnan Rustandik 2	indon12345	201	1990-11-23 00:00:00	2009-11-23 15:44:52	denggi	37	19	4
<input type="checkbox"/>	pudin	12345	205	1990-11-23 00:00:00	2009-11-23 15:50:04	tstng distance	37	19	5
<input type="checkbox"/>	temp testing	091123-43-5355	201	2009-11-23 00:00:00	2009-11-23 18:48:45	malaria	37	1	7
<input type="checkbox"/>	temp testing 2	1234	203	2009-11-23 00:00:00	2009-11-23 19:02:20	typhoid	37	1	8
<input type="checkbox"/>	Hary Urliadi	indon1234	203	1976-08-15 00:00:00	2009-11-24 12:38:32	Malaria	37	31	9
<input type="checkbox"/>	ili	1234	201	2009-12-24 00:00:00	2009-11-24 12:50:21	distance testing	35	2	12





























































Check All / Uncheck All With selected:







Show: 30 row(s) starting from record # 0

in horizontal mode and repeat headers after 100 cells

phpMyAdmin Server: localhost Database: hospital_db Table: archives

[Browse](#)
[Structure](#)
[SQL](#)
[Search](#)
[Insert](#)
[Export](#)
[Import](#)
[Operations](#)
[Empty](#)
[Drop](#)

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> name	varchar(65)	latin1_general_ci		Yes	NULL		     
<input type="checkbox"/> ic_num	varchar(25)	latin1_general_ci		Yes	NULL		     
<input type="checkbox"/> tagid	varchar(15)	latin1_general_ci		Yes	NULL		     
<input type="checkbox"/> dateofbirth	datetime			Yes	NULL		     
<input type="checkbox"/> dateofadmin	datetime			Yes	NULL		     
<input type="checkbox"/> diagnosis	varchar(45)	latin1_general_ci		Yes	NULL		     
<input type="checkbox"/> temperature	varchar(6)	latin1_general_ci		Yes	NULL		     
<input type="checkbox"/> age	int(11)			Yes	NULL		     
<input type="checkbox"/> time	datetime			Yes	NULL		     
<input type="checkbox"/> count	int(11)			No		auto_increment	     

[Check All / Uncheck All With selected:](#)







[Print view](#)
[Propose table structure](#)

Add field(s)
 At End of Table
 At Beginning of Table
 After name

Show: row(s) starting from record #

 Page number:

in mode and repeat headers after cells

Sort by key:

	name	ic_num	tagid	dateofbirth	dateofadmin	diagnosis	temperature	age	time
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		39.25	0	2009-11-23 12:49:57
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		39.375	0	2009-11-23 12:50:32
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		39.25	0	2009-11-23 12:51:38
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.375	0	2009-11-23 12:53:05
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.25	0	2009-11-23 12:53:26
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.5	0	2009-11-23 12:53:55
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.5	0	2009-11-23 12:54:22
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.375	0	2009-11-23 12:54:44
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.125	0	2009-11-23 12:55:07
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.125	0	2009-11-23 12:55:28
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31	0	2009-11-23 12:55:49
<input type="checkbox"/>			203	0000-00-00 00:00:00	0000-00-00 00:00:00		35.875	0	2009-11-23 15:42:39
<input type="checkbox"/>			203	0000-00-00 00:00:00	0000-00-00 00:00:00		35.875	0	2009-11-23 15:42:39
<input type="checkbox"/>			201	0000-00-00 00:00:00	0000-00-00 00:00:00		31.75	0	2009-11-23 15:42:40
<input type="checkbox"/>			203	0000-00-00 00:00:00	0000-00-00 00:00:00		35.875	0	2009-11-23 15:42:41
<input type="checkbox"/>			203	0000-00-00 00:00:00	0000-00-00 00:00:00		35.75	0	2009-11-23 15:42:54
<input type="checkbox"/>			203	0000-00-00 00:00:00	0000-00-00 00:00:00		35.75	0	2009-11-23 15:42:55
<input type="checkbox"/>			203	0000-00-00 00:00:00	0000-00-00 00:00:00		35.75	0	2009-11-23 15:43:01

APPENDIX B
Visual Basic Source Code

i. Login

```
Imports System.IO
Imports MySql.Data.MySqlClient
```

```
Public Class login
```

```
    Private Sub login_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
```

```
        End Sub
```

```
    Private Function checkPswd(ByVal name As String, ByVal pswd As String) As
Boolean
```

```
        Dim found As Boolean = False
        Dim rows As Integer = 0
        Dim myConnString As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="
        Dim cn As New MySqlConnection(myConnString)
        Dim cmdGH As New MySqlCommand("SELECT * FROM registration WHERE
user_name = " & name & " AND password = " & pswd & "", cn)
        Dim daGH As New MySqlDataAdapter
        Dim dsGH As New DataSet
        Dim dtGH As New DataTable
```

```
        cn.Open()
```

```
        Try
```

```
            daGH.SelectCommand = cmdGH
            daGH.Fill(dsGH, "employees")
            dtGH = dsGH.Tables("employees")
            rows = dtGH.Rows.Count()
```

```
        Catch ex As Exception
```

```
            MsgBox("Error: " & ex.Source & ": " & ex.Message, MsgBoxStyle.OkOnly,
"Connection Error !!")
```

```
        End Try
```

```
        cn.Close()
```

```
        If (rows > 0) Then
```

```
            found = True
```

```
        Else
```

```
            found = False
```

```
        End If
```

```
        Return found
```

```
    End Function
```

```
    Private Sub btnLogin_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnLogin.Click
```

```

    If (checkPswd(txtUname.Text, txtPswd.Text) = True) Then
        Main_Menu.Show()
        Me.Hide()
    Else
        MessageBox.Show("Incorrect User name or Password")
    End If
End Sub

```

```

Private Sub btnClear_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnClear.Click
    txtUname.Text = ""
    txtPswd.Text = ""
End Sub

```

```

Private Sub btnExit_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnExit.Click
    Me.Close()
End Sub

```

End Class

ii. Main menu

Public Class Main_Menu

```

Private Sub Button4_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button4.Click

```

```

    Dim drExit As DialogResult
    drExit = MessageBox.Show("Do you really want to Exit ?", "Exit Conformation", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Close()
    End If
End Sub

```

```

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    Dim drExit As DialogResult
    drExit = MessageBox.Show("Go to patient Records ?", "Patient Records", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Hide()
        records_menu.Show()
    End If
End Sub

```

```

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Dim drExit As DialogResult

```

```

        drExit = MessageBox.Show("go to Aministartion module ?", "Administration", _
            MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
            MessageBoxDefaultButton.Button2)
        If drExit = DialogResult.Yes Then
            Me.Hide()
            System_admin.Show()
        End If
    End Sub

    Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As
        System.EventArgs)

    End Sub

    Private Sub Main_Menu_Load(ByVal sender As System.Object, ByVal e As
        System.EventArgs) Handles MyBase.Load

    End Sub

    Private Sub Button5_Click(ByVal sender As System.Object, ByVal e As
        System.EventArgs) Handles BtnConnectStart.Click
        ConnStart.Show()
    End Sub
End Class

```

iii. Start Connection

```

Imports System.Data
Imports System
Imports System.Runtime.InteropServices
Imports Microsoft.VisualBasic
Imports AW_API_NET
Imports System.IO
Imports MySql.Data.MySqlClient
Imports System.Threading

Public Class ConnStart

    Dim Hconn As IntPtr
    Dim readerIP(20) As Byte
    Dim readerPort As UInt16
    Dim commPort As UInt32
    Dim commBaud As UInt32
    Dim myPKTID As Integer
    Dim registered As Boolean
    Dim ActiveWaveAPI As AW_API_NET.APINetClass = New
        AW_API_NET.APINetClass
    Dim ReaderEventHandler As AW_API_NET.fReaderEvent
    Dim TagEventHandler As AW_API_NET.fTagEvent
    Dim pubReaderID As Integer

```

```
Dim strCn As String = "Database=hospital_db;Data Source=localhost;User  
Id=root;Password="
```

```
Private Sub ConnStart_Load(ByVal sender As System.Object, ByVal e As  
System.EventArgs) Handles MyBase.Load
```

```
    readerPort = Convert.ToUInt16(10001)  
    commPort = Convert.ToUInt32(1)  
    commBaud = Convert.ToUInt32(115200)
```

```
    ' Initialize callback functions  
    ReaderEventHandler = New AW_API_NET.fReaderEvent(AddressOf  
Me.OnReaderEvent) 'AddressOf Me.OnReaderEvent  
    TagEventHandler = New AW_API_NET.fTagEvent(AddressOf Me.OnTagEvent)
```

```
    registered = False
```

```
End Sub
```

```
Private Function OnReaderEvent(ByVal readerEvent As  
AW_API_NET.rfReaderEvent_t) As Integer
```

```
    Dim ipStr As String = ""
```

```
    'Beep()  
    If  
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_SCAN_  
NETWORK)) Then  
        For i As Integer = 0 To readerEvent.ip.Length - 1  
            ipStr += Convert.ToChar(readerEvent.ip(i))  
        Next i  
        IPListBox.Items.Add(ipStr)  
    ElseIf  
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_OPEN_  
SOCKET)) Then  
        For i As Integer = 0 To readerEvent.ip.Length - 1  
            ipStr += Convert.ToChar(readerEvent.ip(i))  
        Next i  
        'AddMsg("Socket Opened IP = " + ipStr)  
    ElseIf  
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_CLOSE_  
_SOCKET)) Then  
        For i As Integer = 0 To readerEvent.ip.Length - 1  
            ipStr += Convert.ToChar(readerEvent.ip(i))  
        Next i  
        'AddMsg("Socket Closed IP = " + ipStr)
```

```
    Dim index As Integer  
    If ipStr.Length > 0 Then  
        index = IPListBox.FindStringExact(ipStr)  
        If index >= 0 Then  
            IPListBox.Items.RemoveAt(index)
```

```

        End If
    End If
    ElseIf
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_STD_F
GEN_POWERUP)) Then
        'FGenIDTextBox.Text = readerEvent.fGenerator.ToString()
        'AddMsg("STD FGen Powered UP")
    ElseIf
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_READ
ER_POWERUP)) Then
        'ReaderIDTextBox.Text = readerEvent.reader.ToString()
        'tText(readerEvent.reader.ToString())
        'AddMsg("Reader Powered UP")
    ElseIf
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_QUER
Y_STD_FGEN)) Then
        Dim str As String

        'AddMsg(readerEvent.eventType.ToString)
        'AddMsg(AW_API_NET.APIConsts.RF_READER_POWERUP.ToString)

        'AddMsg("STD FGEN Query _____")
        str = readerEvent.smartFgen.fsValue
        'AddMsg("FS Value = " + str)
        str = readerEvent.smartFgen.txTime
        'AddMsg("TX Time = " + str)
        str = readerEvent.smartFgen.waitTime
        'AddMsg("Wait Time = " + str)
        str = readerEvent.smartFgen.assignRdr
        'AddMsg("Assigned Rdr = " + str)
    ElseIf
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_GET_R
DR_FS)) Then
        'FSTextBox.Text = readerEvent.smartFgen.fsValue.ToString()
        'AddMsg("Reader ID:" + readerEvent.reader.ToString() + " FS:" +
readerEvent.smartFgen.fsValue.ToString())
    ElseIf
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_SET_R
DR_FS)) Then
        'AddMsg("Reader FS was set successfully")
    ElseIf
readerEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_SCAN_
IP)) Then
        ipStr = GetStringIP(readerEvent.ip)
        If ipStr.Length > 0 Then
            If IPListBox.FindStringExact(ipStr) = -1 Then
                IPListBox.Items.Add(ipStr)
            End If
            'AddMsg("ScanIP IP=" + ipStr)
        End If
    End If
End If

```

```

    ReportReaderEvent(readerEvent)

    Return 0
End Function

Private Sub ReportReaderEvent(ByRef readerEvent As
AW_API_NET.rfReaderEvent_t)

    If readerEvent.errorStatus.ToString() = 0 Then
        commStatus.Text = "ON"
        pubReaderID = readerEvent.reader.ToString()
    End If

End Sub

Private Function OnTagEvent(ByVal tagEvent As AW_API_NET.rfTagEvent_t) As
Integer

    Dim ipStr As String = ""

    If
tagEvent.eventType.Equals(Convert.ToUInt16(AW_API_NET.APIConsts.RF_TAG_REA
D)) Then
        Dim str As String
        Dim n As Integer
        n = CInt(Convert.ToInt16(tagEvent.tag.dataLen))
        For i As Integer = 0 To n - 1
            str = tagEvent.tag.data(i)
            ipStr += str + ""
        Next
    End If

    ReportTagEvent(tagEvent)

    Return 0
End Function

Private Sub ReportTagEvent(ByRef tagEvent As AW_API_NET.rfTagEvent_t)

    If tagEvent.tag.id <> 0 Then
        If tagEvent.tag.temp.temperature <> 0 Then
            'MessageBox.Show(tagEvent.tag.id.ToString + " " +
tagEvent.tag.temp.temperature.ToString)
            insertrow(tagEvent.tag.id.ToString(), tagEvent.tag.temp.temperature.ToString,
tagEvent.errorStatus.ToString())
            insertrow1(tagEvent.tag.id.ToString(), tagEvent.tag.temp.temperature.ToString,
tagEvent.errorStatus.ToString())
        End If

        If tagEvent.tag.temp.temperature > 38.9 Then
            MessageBox.Show(tagEvent.tag.id.ToString() + " " + "temperature very
high")
        End If
    End If
End Sub

```

```
        insertrow(tagEvent.tag.id.ToString(), tagEvent.tag.temp.temperature.ToString,
tagEvent.errorStatus.ToString())
```

```
    End If
End If
```

```
End Sub
```

```
Private Sub insertrow(ByVal tgid As Integer, ByVal temp As String, ByVal st As
Integer)
```

```
    Dim cn As New MySqlConnection(strCn)
    Dim cn1 As New MySqlConnection(strCn)
```

```
    Dim prvTime As DateTime = Nothing
    Dim prvTime1 As DateTime = Nothing
    Dim name = Nothing = ""
    Dim prvName As String = ""
    Dim prvIC_Num As String = ""
    Dim prvtagid As String = ""
    Dim prvDateofbirth As DateTime = Now
    Dim prvdateofadmin As DateTime = Now
    Dim prvDiagnosis As String = ""
    Dim prvTemperature As Integer = 0
    Dim prvage As Integer = 0
```

```
    If st = 0 Then
```

```
        Dim prvTimeCmd As New MySqlCommand("SELECT time FROM temptrack
WHERE tagID = " & tgid.ToString & "", cn)
```

```
        Dim prvTimeCmd3 As New MySqlCommand("SELECT name FROM
patint_details WHERE tagID = " & tgid.ToString & "", cn1)
```

```
        Dim prvTimeRdr As MySqlDataReader
```

```
        cn.Open()
        prvTimeRdr = prvTimeCmd.ExecuteReader
```

```
        While prvTimeRdr.Read
            prvTime = prvTimeRdr.Item("time")
        End While
```

```
        cn.Close()
```

```
        If (Format(prvTime, "yyyy-MM-dd HH:mm:ss") <
Format(DateTime.Now.AddSeconds(-20), "yyyy-MM-dd HH:mm:ss")) Then
```

```
            Dim insCmd As New MySqlCommand("INSERT INTO temptrack (tagID,
name, temperature, time) VALUES (" & tgid.ToString & ", " & name & ", " & temp &
", " & Format(DateTime.Now, "yyyy-MM-dd HH:mm:ss") & ")", cn)
```

```
            Dim insCmd2 As New MySqlCommand("INSERT INTO archives (name,
ic_num, tagid, dateofbirth, dateofadmin, diagnosis, temperature, age, time) VALUES (" &
prvName & ", " & prvIC_Num & ", " & tgid.ToString & ", " & prvDateofbirth & ", " &
```

```

prvdateofadmin & "," & prvDiagnosis & "," & temp & "," & prvage & "," &
Format(DateTime.Now, "yyyy-MM-dd HH:mm:ss") & ""), cn)

        cn.Open()
        insCmd.ExecuteNonQuery()
        insCmd2.ExecuteNonQuery()
        cn.Close()
        'MessageBox.Show(tgid.ToString + " " + temp)
    End If

End If
End Sub
Private Sub insertrow1(ByVal tgid As Integer, ByVal temp As String, ByVal st As
Integer)
    'Dim cn As New MySqlConnection(strCn)
    Dim cn1 As New MySqlConnection(strCn)

    Dim prvTime As DateTime = Nothing
    'Dim prvTime1 As DateTime = Nothing
    Dim name = Nothing = ""
    Dim prvName As String = ""
    Dim prvIC_Num As String = ""
    Dim prvtagid As String = ""
    Dim prvDateofbirth As DateTime = Now
    Dim prvdateofadmin As DateTime = Now
    Dim prvDiagnosis As String = ""
    Dim prvTemperature As Integer = 0
    Dim prvage As Integer = 0

    If st = 0 Then

        'Dim prvTimeCmd As New MySqlCommand("SELECT time FROM temptrack
WHERE tagID = " & tgid.ToString & """, cn)
        Dim prvTimeCmd As New MySqlCommand("SELECT * FROM patint_details
WHERE tagid_patid = " & tgid.ToString & """, cn1)
        'Dim prvTimeCmd2 As New MySqlCommand("SELECT time FROM temptrack
WHERE tagID = " & tgid.ToString & """, cn)

        Dim prvTimeRdr As MySqlDataReader

        '    cn.Open()
        '    prvTimeRdr = prvTimeCmd.ExecuteReader
        '
        'prvTimeRdr1 = prvTimeCmd1.ExecuteReader
        '    While prvTimeRdr.Read
        '    prvTime = prvTimeRdr.Item("time")
        '    End While

        'cn.Close()

        'Dim prvTimeRdr As MySqlDataReader
        cn1.Open()

```



```

prvTimeRdr = prvTimeCmd.ExecuteReader
prvTimeRdr = prvTimeCmd.ExecuteReader
' While prvTimeRdr.Read

' End While
While prvTimeRdr.Read
    prvTime = Now
    prvTimeRdr.Item("time")
    prvName = prvTimeRdr.Item("name")
    prvIC_Num = prvTimeRdr.Item("ic_num")
    prvtagid = prvTimeRdr.Item("tagid_patid")
    prvDateofbirth = prvTimeRdr.Item("dateofbirth")
    prvdateofadmin = prvTimeRdr.Item("dateofadmin")
    prvDiagnosis = prvTimeRdr.Item("diagnosis")
    prvTemperature = prvTimeRdr.Item("temperature")
    prvage = prvTimeRdr.Item("age")

End While
cn1.Close()

'If (Format(prvTime, "yyyy-MM-dd HH:mm:ss") <
Format(DateTime.Now.AddSeconds(-20), "yyyy-MM-dd HH:mm:ss")) Then
    'Dim insCmd As New MySqlCommand("INSERT INTO temptrack (tagID, name,
temperature, time) VALUES (" & tgid.ToString & ", " & name & ", " & temp & ", " &
Format(DateTime.Now, "yyyy-MM-dd HH:mm:ss") & ")", cn)

    ' Dim insCmd2 As New MySqlCommand("INSERT INTO archives (name,
ic_num, tagid, dateofbirth, dateofadmin, diagnosis, temperature, age, time) VALUES (" &
prvName & ", " & prvIC_Num & ", " & tgid.ToString & ", " & prvDateofbirth & ", " &
prvdateofadmin & ", " & prvDiagnosis & ", " & temp & ", " & prvage & ", " &
Format(DateTime.Now, "yyyy-MM-dd HH:mm:ss") & ")", cn1)

'cn.Open()
'insCmd.ExecuteNonQuery()
'insCmd2.ExecuteNonQuery()
'cn.Close()
'MessageBox.Show(tgid.ToString + " " + temp)
'End If

If (Format(prvTime, "yyyy-MM-dd HH:mm:ss") <
Format(DateTime.Now.AddSeconds(-20), "yyyy-MM-dd HH:mm:ss")) Then
    'Dim insCmd As New MySqlCommand("INSERT INTO temptrack (tagID,
name, temperature, time) VALUES (" & tgid.ToString & ", " & name & ", " & temp &
", " & Format(DateTime.Now, "yyyy-MM-dd HH:mm:ss") & ")", cn)

    Dim insCmd2 As New MySqlCommand("INSERT INTO archives (name,
ic_num, tagid, dateofbirth, dateofadmin, diagnosis, temperature, age, time) VALUES (" &
prvName & ", " & prvIC_Num & ", " & tgid.ToString & ", " & prvDateofbirth & ", " &
prvdateofadmin & ", " & prvDiagnosis & ", " & temp & ", " & prvage & ", " &
Format(DateTime.Now, "yyyy-MM-dd HH:mm:ss") & ")", cn1)

cn1.Open()

```

```

        'insCmd.ExecuteNonQuery()
        insCmd2.ExecuteNonQuery()
        cn1.Close()
        'MessageBox.Show(tgid.ToString + " " + temp)
    End If

End If
End Sub

Public Function GetStringIP(ByVal ip As Byte()) As String

    Dim p As Integer
    Dim s As String
    Dim ct As Integer

    ct = 0
    p = 0
    s = ""
    While (Convert.ToBoolean((ct <= 3)) AndAlso Convert.ToBoolean((p < 20))
AndAlso Convert.ToBoolean((ip(p) <> 0)))
        If ip(p) <> 46 Then
            s += Convert.ToString(ip(p) - 48) & "-"
            p += 1
        Else
            ct += 1
            p += 1
            s += "."
        End If

    End While
    Return s
End Function

Private Sub readConfig()
    Try
        ' Create an instance of StreamReader to read from a file.
        Using sr As StreamReader = New StreamReader("config.txt")
            Dim line As String
            ' Read and display the lines from the file until the end
            ' of the file is reached.
            frmConfig.lbIp.Items.Clear()
            line = sr.ReadLine()
            If Mid(line, 1, 3) = "ip:" Then
                frmConfig.lbIp.Items.Add(Mid(line, 4))
            End If
            'lbIp.Items.Clear()
            While Not line Is Nothing
                line = sr.ReadLine()
                If Mid(line, 1, 3) = "ip:" Then
                    frmConfig.lbIp.Items.Add(Mid(line, 4))
                End If
            End While
        End Try
    End Sub

```

```

        sr.Close()
    End Using
Catch E As Exception
    ' Let the user know what went wrong.
    Console.WriteLine("The file could not be read:")
    Console.WriteLine(E.Message)
End Try

End Sub

Private Sub BtnConnect_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles BtnConnect.Click
    scanIP()
    commStatus.BackColor = Color.DarkSeaGreen
End Sub

Private Sub scanIP()
    Dim iRet As Integer
    Dim ip(20) As Byte
    Dim stripx As String

    readIp()

    If (myPKTID >= 223) Then
        myPKTID = 1
    Else
        myPKTID = myPKTID + 1
    End If

    If registered = False Then

        ActiveWaveAPI.rfRegisterReaderEvent(ReaderEventHandler)

        ActiveWaveAPI.rfRegisterTagEvent(TagEventHandler)

        registered = True
    End If

    For c As Integer = 0 To frmConfig.lbIp.Items.Count - 1
        stripx = frmConfig.lbIp.Items.Item(c).ToString

        For i As Integer = 0 To stripx.ToString.Length - 1
            ip(i) = Convert.ToByte(stripx.ToString.Chars(i))
        Next i
        iRet = ActiveWaveAPI.rfScanIP(ip, Convert.ToUInt16(myPKTID))

    Next c
    OpenConn()
End Sub

Private Sub OpenConn()
    Dim iRet As Integer

```

```

Dim ip(20) As Byte
Dim cIP(20) As Char
Dim stripx As String = "192.168.10.26"

If (myPKTID >= 223) Then
    myPKTID = 1
Else
    myPKTID = myPKTID + 1
End If
iRet = ActiveWaveAPI.rfOpenSocket(readerIP, readerPort, False,
Convert.ToUInt16(AW_API_NET.APIConsts.ALL_IPS), Convert.ToUInt16(myPKTID))

If (myPKTID >= 223) Then
    myPKTID = 1
Else
    myPKTID = myPKTID + 1
End If
iRet = ActiveWaveAPI.rfResetReader(UInt16.Parse(1), UInt16.Parse(0),
UInt16.Parse(0), Convert.ToUInt16(AW_API_NET.APIConsts.ALL_READERS),
Convert.ToUInt16(myPKTID))

End Sub

Private Sub readIp()
    Try
        Using sr As StreamReader = New StreamReader("config.txt")
            Dim line As String
            line = sr.ReadLine()
            If Mid(line, 1, 3) = "ip:" Then
                frmConfig.lbIp.Items.Add(Mid(line, 4))
            End If
            While Not line Is Nothing
                line = sr.ReadLine()
                If Mid(line, 1, 3) = "ip:" Then
                    frmConfig.lbIp.Items.Add(Mid(line, 4))
                End If
            End While
            sr.Close()
        End Using
    Catch E As Exception
        ' Let the user know what went wrong.
        Console.WriteLine("The file could not be read:")
        Console.WriteLine(E.Message)
    End Try
End Sub

Private Sub CloseConn()

    Dim iRet As Integer
    Dim ip(20) As Byte
    Dim cIP(20) As Char

```

```

    If (myPKTID >= 223) Then
        myPKTID = 1
    Else
        myPKTID = myPKTID + 1
    End If

    'If AllIPRadioButton.Checked Then
    iRet = ActiveWaveAPI.rfCloseSocket(readerIP,
Convert.ToUInt16(AW_API_NET.APIConsts.ALL_IPS))
    IPListBox.Items.Clear()

End Sub

Private Sub btnConfig_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnConfig.Click

    frmConfig.Show()

End Sub

Private Sub tmrTemp_Tick(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles tmrTemp.Tick
    rqstTemp()
End Sub

Private Sub rqstTemp()
    Dim iRet As Integer
    Dim tagSelect As AW_API_NET.rfTagSelect_t
    Dim tagList(50) As UInt32
    Dim rdrID As UInt16
    Dim longInterval As Boolean
    Dim RdrCmdType As Integer

    rdrID = UInt16.Parse(0)

    RdrCmdType = APIConsts.ALL_READERS

    tagSelect.tagList = tagList

    tagSelect.tagList(0) = UInt32.Parse(0)
    tagSelect.numTags = Convert.ToUInt32(50)

    tagSelect.selectType =
Convert.ToUInt32(AW_API_NET.APIConsts.RF_SELECT_FIELD)

    tagSelect.tagType = APIConsts.ACCESS_TAG

    If (myPKTID >= 223) Then
        myPKTID = 1
    Else
        myPKTID = myPKTID + 1
    End If

```

```

    longInterval = False

    'iRet = ActiveWaveAPI.rfCallTags(UInt16.Parse(1), rdrID, UInt16.Parse(0),
    UInt16.Parse(0), tagSelect, True, longInterval, Convert.ToUInt16(RdrCmdType),
    Convert.ToUInt16(myPKTID))
    'iRet = ActiveWaveAPI.rfQueryTags(UInt16.Parse(1), rdrID, UInt16.Parse(0),
    tagSelect, True, longInterval, Convert.ToUInt16(RdrCmdType),
    Convert.ToUInt16(myPKTID))
    iRet = ActiveWaveAPI.rfGetTagTemp(UInt16.Parse(1), rdrID, UInt16.Parse(0),
    tagSelect, True, longInterval, Convert.ToUInt16(RdrCmdType),
    Convert.ToUInt16(myPKTID))

    End Sub

    Private Sub BtnStart_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles BtnStart.Click
        tmrTemp.Enabled = True
    End Sub

    Private Sub BtnHide_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles BtnHide.Click
        Me.Hide()
    End Sub
End Class

```

iv. System administration

```

Public Class System_admin

    Private Sub Button4_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles Button4.Click

        Dim drExit As DialogResult
        drExit = MessageBox.Show("Do you really want to Exit ?", "Exit Conformation", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
        If drExit = DialogResult.Yes Then
            Me.Close()
        End If
    End Sub

    Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles Button3.Click
        Dim drExit As DialogResult
        drExit = MessageBox.Show("Back to Main Menu ?", "Back Conformation", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
        If drExit = DialogResult.Yes Then
            Me.Hide()
            Main_Menu.Show()
        End If
    End Sub

```

```

End Sub

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Dim drExit As DialogResult
    drExit = MessageBox.Show("Add New User ?", "Add User", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Hide()
        add_admin.Show()
    End If
End Sub

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    Dim drExit As DialogResult
    drExit = MessageBox.Show("Add New Patient", "Add Patient", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Hide()
        Patient_reg.Show()
    End If
End Sub

Private Sub Button5_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button5.Click
    Me.Hide()
    frmDelete.Show()
End Sub
End Class

```

v. **Admin Registration**

```

Imports MySql.Data.MySqlClient
Public Class add_admin

```

```

    Private Sub Button4_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button4.Click

        Dim drExit As DialogResult
        drExit = MessageBox.Show("Do you really want to Exit ?", "Exit Conformation", _
            MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
            MessageBoxDefaultButton.Button2)
        If drExit = DialogResult.Yes Then
            Me.Close()
        End If
    End Sub

```

```

Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button3.Click

    Dim drExit As DialogResult
    drExit = MessageBox.Show("Back to Main Menu ?", "Back Conformation", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Hide()
        Main_Menu.Show()
    End If

End Sub

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    txtIDnum.Clear()
    txtName.Clear()
    'txtPswd1.Clear()
    txtpswd.Clear()
    txtUname.Clear()
    txtIDnum.Focus()
End Sub

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Dim name As String = txtName.Text.ToString
    Dim rowsCheck As Integer = 0
    Dim ID As String = txtIDnum.Text.ToString
    Dim Post As String = cboPost.Text.ToString
    Dim user_name As String = txtUname.Text.ToString
    Dim Password As String = txtpswd.Text.ToString
    Dim dochp As String = txtHP.Text
    Dim strCn As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="

    'Connect to database
    Dim cn As New MySqlConnection(strCn)

    'Open database
    Dim cmdCheck As New MySqlCommand("SELECT * FROM registration WHERE
user_name = '" & user_name & "'", cn)
    Dim daCheck As New MySqlDataAdapter
    Dim dsCheck As New DataSet
    Dim dtCheck As New DataTable

    cn.Open()

    'Check from table (search)
    Try
        With daCheck
            .SelectCommand = cmdCheck

```



```

        .Fill(dsCheck, "searchresult")
    End With
    dtCheck = dsCheck.Tables("searchresult")
    rowsCheck = dtCheck.Rows.Count()

    'If unable to connect, show error!
    Catch ex As Exception
        MsgBox("Error: " & ex.Source & ": " & ex.Message, MsgBoxStyle.OkOnly,
"Connection Error !!")
    End Try

    'If already connected, close connection
    If CBool(ConnectionState.Open) Then
        cn.Close()
    End If

    If rowsCheck = 0 Then
        'Open connection
        cn.Open()

        'Check for name and if no existing inmates available, add them
        Dim cmdIns As New MySqlCommand("INSERT INTO registration (ID, Post,
user_name, Password, name, DoctorHP) VALUES (" & ID & "," & Post & "," &
user_name & "," & Password & "," & name & "," & dochp & ")", cn)
        cmdIns.ExecuteNonQuery()

        If CBool(ConnectionState.Open) Then
            cn.Close()
        End If

        'If registration successful, show ID and name
        MsgBox(name + "/" + ID + " has been registered successfully")

    Else
        'If already existing officer, show error
        MsgBox("Error!!! " + name + "is already registered in the database")

    End If

End Sub
End Class

```

vi. Patient registration

```

Imports System.Data
Imports MySql.Data.MySqlClient

```

```

Public Class Patient_reg

```

```

    Private Sub Button4_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button4.Click

```

```

    Dim drExit As DialogResult
    drExit = MessageBox.Show("Do you really want to Exit ?", "Exit Conformation", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Close()
    End If
End Sub

```

```

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    Dim drExit As DialogResult
    drExit = MessageBox.Show("Back to Main Menu ?", "Back Conformation", _
        MessageBoxButtons.YesNo, MessageBoxIcon.Warning,
        MessageBoxDefaultButton.Button2)
    If drExit = DialogResult.Yes Then
        Me.Hide()
        Main_Menu.Show()
    End If
End Sub

```

```

Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button3.Click
    txtAge.Clear()
    txtdateofadmit.Clear()
    txtDiag.Clear()
    txtDob.Clear()
    txtICnum.Clear()
    txtName.Clear()
    txtPatID.Clear()
    txtTemp.Clear()
    cboTagID.ResetText()
    txtAge.Focus()

End Sub

```

```

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Dim name As String = txtName.Text.ToString
    Dim rowsCheck As Integer = 0
    Dim icnum As String = txtICnum.Text.ToString
    Dim diag As String = txtDiag.Text.ToString
    Dim dob As String = txtDob.Text.ToString
    Dim temp As String = txtTemp.Text.ToString
    Dim tagid As String = cboTagID.Text.ToString
    Dim age As String = txtPatID.Text.ToString
    Dim doa As DateTime = DateTime.Now
    Dim strCn As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="

    'Connect to database
    Dim cn As New MySqlConnection(strCn)

```

```

'Open database
Dim cmdCheck As New MySqlCommand("SELECT * FROM patint_details
WHERE tagid_patid = '" & tagid & "'", cn)
Dim daCheck As New MySqlDataAdapter
Dim dsCheck As New DataSet
Dim dtCheck As New DataTable

cn.Open()

'Check from table (search)
Try
    With daCheck
        .SelectCommand = cmdCheck
        .Fill(dsCheck, "searchresult")
    End With
    dtCheck = dsCheck.Tables("searchresult")
    rowsCheck = dtCheck.Rows.Count()

    'If unable to connect, show error!
Catch ex As Exception
    MsgBox("Error: " & ex.Source & ": " & ex.Message, MsgBoxStyle.OkOnly,
"Connection Error !!")
End Try

'If already connected, close connection
If CBool(ConnectionState.Open) Then
    cn.Close()
End If

If rowsCheck = 0 Then
    'Open connection
    cn.Open()

    'Check for name and if no existing inmates available, add them
    Dim cmdIns As New MySqlCommand("INSERT INTO patint_details (name,
ic_num, tagid_patid, dateofbirth, dateofadmin, diagnosis, temperature, age) VALUES ('"
& name & "','" & icnum & "','" & tagid & "','" & dob & "','" & Format(DateTime.Now,
"yyyy-MM-dd HH:mm:ss") & "','" & diag & "','" & temp & "','" & age & "')", cn)
    Dim cmdIns1 As New MySqlCommand("INSERT INTO archive_names (name,
ic_num, tagid, dateofbirth, dateofadmin, diagnosis, temperature, age) VALUES ('"
& name & "','" & icnum & "','" & tagid & "','" & dob & "','" & Format(DateTime.Now,
"yyyy-MM-dd HH:mm:ss") & "','" & diag & "','" & temp & "','" & age & "')", cn)

    cmdIns.ExecuteNonQuery()
    cmdIns1.ExecuteNonQuery()
    If CBool(ConnectionState.Open) Then
        cn.Close()
    End If

    'If registration successful, show ID and name
    MsgBox(name + "/" + icnum + " has been registered successfully")

```

```

Else
    'If already existing officer, show error
    MsgBox("Error!!! " + name + "is already registered in the database")

End If
End Sub

Private Sub Patient_reg_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load

End Sub

Private Sub cboTagID_SelectedIndexChanged(ByVal sender As System.Object, ByVal
e As System.EventArgs) Handles cboTagID.SelectedIndexChanged

End Sub
End Class

```

vii. Record Menu

```

Public Class records_menu

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Me.Hide()
    Patient_Records.Show()
End Sub

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    Me.Hide()
    achives_data.Show()
End Sub

Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button3.Click
    Me.Hide()
    Main_Menu.Show()
End Sub
End Class

```

viii. Patient Record

```

Imports System.Data
Imports System
Imports System.Runtime.InteropServices
Imports Microsoft.VisualBasic
Imports AW_API_NET
Imports System.IO
Imports MySql.Data.MySqlClient

```

```

Imports System.Threading

Public Class Patient_Records

    Dim strCn As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="
    Dim temper As ListViewItem
    Dim tgID As String
    Private str2 As System.Threading.Thread
    Private str1 As System.Threading.Thread

    Private Sub Patient_Records_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load

        System.Windows.Forms.Control.CheckForIllegalCrossThreadCalls = False

        lvwTemp.Columns.Clear()
        lvwTemp.Columns.Add("Temperature", 100, HorizontalAlignment.Left)
        lvwTemp.Columns.Add("Date                Time", 225,
HorizontalAlignment.Right)

        lvwTemp.Hide()

    End Sub

    Private Sub listDetails()

        Dim name As String = ""
        Dim diagn As String = ""
        Dim birthD As DateTime = Nothing
        Dim age As Integer = 0
        Dim admisD As DateTime = Nothing
        Dim ic As String = ""

        tgID = txtID.Text

        If (checkID(tgID) = True) Then

            If Me.InvokeRequired Then
                Me.Invoke(New MethodInvoker(AddressOf listDetails))
            Else

                'Establish connection
                Dim temp As String = ""
                Dim dat As DateTime = Nothing
                Dim cn As New MySqlConnection(strCn)

                'Fill in Patient details
                Dim cmdDetails As New MySqlCommand("SELECT * FROM patint_details
WHERE tagid_patid = " & tgID & """, cn)
                Dim rdrDetails As MySqlDataReader

```

```

cn.Open()
rdrDetails = cmdDetails.ExecuteReader
While rdrDetails.Read
    name = rdrDetails.Item("name")
    ic = rdrDetails.Item("ic_num")
    birthD = rdrDetails.Item("dateofbirth")
    diagn = rdrDetails.Item("diagnosis")
    age = rdrDetails.Item("age")
    admisD = rdrDetails.Item("dateofadmin")
End While

rdrDetails.Close()
cn.Close()

txtname.Text = name
txtage.Text = age.ToString
txtdiag.Text = diagn
txtdoa.Text = Format(admisD, "yyyy-MM-dd HH:mm:ss")
txtdob.Text = Format(birthD, "yyyy-MM-dd HH:mm:ss")
txticnum.Text = ic

txtname.Show()
txtage.Show()
txtdoa.Show()
txtdiag.Show()
txticnum.Show()
txtdob.Show()
Label3.Show()
Label4.Show()
Label5.Show()
Label6.Show()
Label7.Show()
Label8.Show()

btnConfirm.Show()

End If

Else

MessageBox.Show("There is no record corresponding to this ID")
txtname.Text = ""
txtage.Text = ""
txtdoa.Text = ""
txtdiag.Text = ""
txticnum.Text = ""
txtdob.Text = ""
lvwTemp.Items.Clear()
lvwTemp.Hide()
btnConfirm.Hide()
End If

```

```

End Sub

Sub Thread1()
    listDetails()
End Sub

Private Function checkID(ByVal id As String) As Boolean

    Dim found As Boolean = False
    Dim rows As Integer = 0
    Dim myConnString As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="
    Dim cn As New MySqlConnection(myConnString)
    Dim cmdGH As New MySqlCommand("SELECT * FROM patint_details WHERE
tagid_patid = " & id & """, cn)
    Dim daGH As New MySqlDataAdapter
    Dim dsGH As New DataSet
    Dim dtGH As New DataTable

    cn.Open()

    Try
        daGH.SelectCommand = cmdGH
        daGH.Fill(dsGH, "details")
        dtGH = dsGH.Tables("details")
        rows = dtGH.Rows.Count()
    Catch ex As Exception
        MsgBox("Error: " & ex.Source & ": " & ex.Message, MsgBoxStyle.OkOnly,
"Connection Error !!")
    End Try

    If ConnectionState.Open Then
        cn.Close()
    End If

    If (rows > 0) Then
        found = True
    Else
        found = False
    End If

    Return found

End Function

Private Sub listvw()

    Dim i As Integer = 0

    tgID = txtID.Text
    Dim cn As New MySqlConnection(strCn)
    If Me.InvokeRequired Then

```

```

        Me.Invoke(New MethodInvoker(AddressOf listvw))
    Else

        'Populate the ListView
        Dim cmd As New MySqlCommand("SELECT * FROM temprack WHERE tagID
= " & tgID & "'", cn)
        Dim rdrTemp As MySqlDataReader

        lvwTemp.Items.Clear()

        If cn.State = ConnectionState.Closed Then
            cn.Open()
        End If

        'Display raw in listview (attendlist)
        rdrTemp = cmd.ExecuteReader()
        While rdrTemp.Read
            temper = lvwTemp.Items.Add(rdrTemp.Item("temperature"))
            temper.SubItems.Add(Format(rdrTemp.Item("time"), "yyyy-MM-dd
HH:mm:ss"))
        End While

        rdrTemp.Close()
        cn.Close()

        'coloring background
        While i <= lvwTemp.Items.Count - 1
            If i Mod 2 = 0 Then
                lvwTemp.Items(i).BackColor = Color.Aquamarine
            Else
                lvwTemp.Items(i).BackColor = Color.White
            End If
            i = i + 1
        End While

        lvwTemp.Show()

    End If

End Sub

Sub Thread2()
    listvw()
End Sub

Private Sub btnSearch_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnSearch.Click
    str1 = New Thread(AddressOf Thread1)
    str1.Start()
End Sub

```



```

Private Sub btnConfirm_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnConfirm.Click
    str2 = New Thread(AddressOf Thread2)
    str2.Start()
End Sub

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    Main_Menu.Show()
    Me.Hide()
End Sub

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Me.Close()
End Sub
End Class

```

ix. Archive Data

```

Imports System.Data
Imports System
Imports System.Runtime.InteropServices
Imports Microsoft.VisualBasic
Imports AW_API_NET
Imports System.IO
Imports MySql.Data.MySqlClient
Imports System.Threading

Public Class achives_data

    Dim strCn As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="
    Dim temper As ListViewItem
    Dim tgID As String
    Private str2 As System.Threading.Thread
    Private str1 As System.Threading.Thread

    Private Sub achives_data_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load

        System.Windows.Forms.Control.CheckForIllegalCrossThreadCalls = False

        lvwTemp.Columns.Clear()
        lvwTemp.Columns.Add("Temperature", 100, HorizontalAlignment.Left)
        lvwTemp.Columns.Add("Date                Time", 225,
HorizontalAlignment.Right)

        lvwTemp.Hide()

    End Sub

```

```

Private Sub listDetails()

    Dim name As String = ""
    Dim diagn As String = ""
    Dim birthD As DateTime = Nothing
    Dim age As Integer = 0
    Dim admisD As DateTime = Nothing
    Dim ic As String = ""

    tgID = txtID.Text

    If (checkID(tgID) = True) Then

        If Me.InvokeRequired Then
            Me.Invoke(New MethodInvoker(AddressOf listDetails))
        Else

            'Establish connection
            Dim temp As String = ""
            Dim dat As DateTime = Nothing
            Dim cn As New MySqlConnection(strCn)

            'Fill in Patient details
            Dim cmdDetails As New MySqlCommand("SELECT * FROM archive_names
WHERE tagid = " & tgID & "", cn)
            Dim rdrDetails As MySqlDataReader

            cn.Open()
            rdrDetails = cmdDetails.ExecuteReader
            While rdrDetails.Read
                name = rdrDetails.Item("name")
                ic = rdrDetails.Item("ic_num")
                birthD = rdrDetails.Item("dateofbirth")
                diagn = rdrDetails.Item("diagnosis")
                age = rdrDetails.Item("age")
                admisD = rdrDetails.Item("dateofadmin")
            End While

            rdrDetails.Close()
            cn.Close()

            txtname.Text = name
            txtage.Text = age.ToString
            txtdiag.Text = diagn
            txtdoa.Text = Format(admisD, "yyyy-MM-dd HH:mm:ss")
            txtdob.Text = Format(birthD, "yyyy-MM-dd HH:mm:ss")
            txticnum.Text = ic

            txtname.Show()
            txtage.Show()
            txtdoa.Show()
            txtdiag.Show()
        End If
    End If
End Sub

```

```

        txticnum.Show()
        txtdob.Show()
        Label3.Show()
        Label4.Show()
        Label5.Show()
        Label6.Show()
        Label7.Show()
        Label8.Show()

        btnConfirm.Show()

    End If

Else

    MessageBox.Show("There is no record corresponding to this ID")
    txtname.Text = ""
    txtage.Text = ""
    txtdoa.Text = ""
    txtdiag.Text = ""
    txticnum.Text = ""
    txtdob.Text = ""
    lvwTemp.Items.Clear()
    lvwTemp.Hide()
    btnConfirm.Hide()
End If

End Sub

Sub Thread1()
    listDetails()
End Sub

Private Function checkID(ByVal id As String) As Boolean

    Dim found As Boolean = False
    Dim rows As Integer = 0
    Dim myConnString As String = "Database=hospital_db;Data Source=localhost;User
Id=root;Password="
    Dim cn As New MySqlConnection(myConnString)
    Dim cmdGH As New MySqlCommand("SELECT * FROM archive_names WHERE
tagid = " & id & """, cn)
    Dim daGH As New MySqlDataAdapter
    Dim dsGH As New DataSet
    Dim dtGH As New DataTable

    cn.Open()

    Try
        daGH.SelectCommand = cmdGH
        daGH.Fill(dsGH, "details")
        dtGH = dsGH.Tables("details")
    
```

```

        rows = dtGH.Rows.Count()
    Catch ex As Exception
        MsgBox("Error: " & ex.Source & ": " & ex.Message, MsgBoxStyle.OkOnly,
"Connection Error !!")
    End Try

    If ConnectionState.Open Then
        cn.Close()
    End If

    If (rows > 0) Then
        found = True
    Else
        found = False
    End If

    Return found

End Function

Private Sub listvw()

    Dim i As Integer = 0

    tgID = txtID.Text
    Dim cn As New MySqlConnection(strCn)
    If Me.InvokeRequired Then
        Me.Invoke(New MethodInvoker(AddressOf listvw))
    Else

        'Populate the ListView
        Dim cmd As New MySqlCommand("SELECT * FROM archives WHERE tagID =
" & tgID & "'", cn)
        Dim rdrTemp As MySqlDataReader

        lvwTemp.Items.Clear()

        If cn.State = ConnectionState.Closed Then
            cn.Open()
        End If

        'Display raw in listview (attendlist)
        rdrTemp = cmd.ExecuteReader()
        While rdrTemp.Read
            temper = lvwTemp.Items.Add(rdrTemp.Item("temperature"))
            temper.SubItems.Add(Format(rdrTemp.Item("time"), "yyyy-MM-dd
HH:mm:ss"))
        End While

        rdrTemp.Close()
        cn.Close()
    End If
End Sub

```

```

'coloring background
While i <= lvwTemp.Items.Count - 1
    If i Mod 2 = 0 Then
        lvwTemp.Items(i).BackColor = Color.Aquamarine
    Else
        lvwTemp.Items(i).BackColor = Color.White
    End If
    i = i + 1
End While

lvwTemp.Show()

End If

End Sub

Sub Thread2()
    listvw()
End Sub

Private Sub btnSearch_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnSearch.Click
    str1 = New Thread(AddressOf Thread1)
    str1.Start()
End Sub

Private Sub btnConfirm_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnConfirm.Click
    str2 = New Thread(AddressOf Thread2)
    str2.Start()
End Sub

Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    Main_Menu.Show()
    Me.Hide()
End Sub

Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Me.Close()
End Sub
End Class

```

x. **SMS Alert**

```
Imports System.Data
Imports System
Imports System.Runtime.InteropServices
Imports Microsoft.VisualBasic
Imports AW_API_NET
Imports System.IO
Imports MySql.Data.MySqlClient
Imports System.Threading

Public Class Details
    Dim strCn As String = "Database=hospital_db;Data
Source=localhost;User Id=root;Password="
    Dim ID As String
    Dim Dname As String
    Dim DrHP As String
    Private str2 As System.Threading.Thread
    Private str1 As System.Threading.Thread
    Dim cn As New MySqlConnection(strCn)
    Dim cn1 As New MySqlConnection(strCn)
    Dim cn2 As New MySqlConnection(strCn)
    Dim rdrDetails As MySqlDataReader
    Dim rdrDetails1 As MySqlDataReader
    Dim rdrDetails2 As MySqlDataReader
    Private Function checkID(ByVal id As String) As Boolean

        Dim found As Boolean = False
        Dim rows As Integer = 0
        Dim myConnString As String = "Database=hospital_db;Data
Source=localhost;User Id=root;Password="
        Dim cn3 As New MySqlConnection(myConnString)
        Dim cmdGH As New MySqlCommand("SELECT * FROM
patint_details WHERE tagid_patid = '" & id & "'", cn3)
        Dim daGH As New MySqlDataAdapter
        Dim dsGH As New DataSet
        Dim dtGH As New DataTable

        cn3.Open()

        Try
            daGH.SelectCommand = cmdGH
            daGH.Fill(dsGH, "details")
            dtGH = dsGH.Tables("details")
            rows = dtGH.Rows.Count()
        Catch ex As Exception
            MsgBox("Error: " & ex.Source & ": " & ex.Message,
MsgBoxStyle.OkOnly, "Connection Error !!")
        End Try

        If ConnectionState.Open Then
            cn3.Close()
        End If

        If (rows > 0) Then
            found = True
        End If
    End Function
End Class
```

```

Else
    found = False
End If

Return found

End Function

Private Sub btnCheck_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnCheck.Click
    Dim cmdDetails As New MySqlCommand("SELECT * FROM
registration WHERE id = '" & txtID.Text & "'", cn)
    cn.Open()

    rdrDetails = cmdDetails.ExecuteReader
    While rdrDetails.Read
        Dname = rdrDetails.Item("name")
        DrHP = rdrDetails.Item("DoctorHP")
    End While
    rdrDetails.Close()
    cn.Close()

    Dim cmdSendData As New MySqlCommand("SELECT * FROM
patint_details WHERE tagid_patid = '" & txtpatID.Text & "'",
cn1)

    Dim Message As Object
    Dim pname As String = ""
    Dim icnum As String = ""
    Dim doa As String = ""
    Dim diagnosis As String = ""
    Dim age As Integer

    cn1.Open()

    rdrDetails1 = cmdSendData.ExecuteReader

    While rdrDetails1.Read
        pname = rdrDetails1.Item("name")
        icnum = rdrDetails1.Item("ic_num")
        doa = rdrDetails1.Item("dateofadmin")
        diagnosis = rdrDetails1.Item("diagnosis")
        age = rdrDetails1.Item("age")
    End While

    rdrDetails1.Close()
    cn1.Close()

    Message = " ATTENTION The Patient: " & pname & " Age "
& age & " Id Number " & icnum & " Admitted on " & doa & "
Diagonised with " & diagnosis & " Temperature is Critical "

    lblAlert.Text = Message
    Shape1.FillColor = System.Drawing.Color.Blue
    Shape2.FillColor = System.Drawing.Color.Blue
    txtName.Text = Dname
    txtHPNum.Text = DrHP

```

```

btnConfirm.Show()
btnBack.Show()
txtName.Show()
Label4.Show()
Label2.Show()
Label5.Show()
LblAlert.Show()
txtHPNum.Show()
txtpatID.Show()

If txtID.Text = "" Then
    LblAlert.Hide()
    btnConfirm.Hide()
    btnBack.Hide()
    txtName.Hide()
    Label4.Hide()
    Label2.Hide()
    txtHPNum.Hide()
    Shape1.FillColor = System.Drawing.Color.Red
    Shape2.FillColor = System.Drawing.Color.Red
    txtID.BackColor = System.Drawing.Color.Red
    MsgBox("Please enter Doctor ID to continue")
    txtID.Focus()
ElseIf txtpatID.Text = "" Then
    LblAlert.Hide()
    btnConfirm.Hide()
    btnBack.Hide()
    txtName.Hide()
    Label4.Hide()
    Label2.Hide()
    txtHPNum.Hide()
    Shape1.FillColor = System.Drawing.Color.Red
    Shape2.FillColor = System.Drawing.Color.Red
    txtpatID.BackColor = System.Drawing.Color.Red
    MsgBox("Please enter Patient ID to continue")
    txtpatID.Focus()
ElseIf Dname = "" Then
    LblAlert.Hide()
    btnConfirm.Hide()
    btnBack.Hide()
    txtName.Hide()
    Label4.Hide()
    Label2.Hide()
    txtHPNum.Hide()
    Shape1.FillColor = System.Drawing.Color.Red
    Shape2.FillColor = System.Drawing.Color.Red
    MsgBox("Enter Valid Doctor ID")
    txtID.BackColor = System.Drawing.Color.Red
    txtID.Text = ""
    txtID.Focus()
ElseIf DrHP = "" Then
    LblAlert.Hide()
    btnConfirm.Hide()
    btnBack.Hide()
    txtName.Hide()
    Label4.Hide()

```



```

        Label2.Hide()
        txtHPNum.Hide()
        Shape1.FillColor = System.Drawing.Color.Red
        Shape2.FillColor = System.Drawing.Color.Red
        MsgBox("Enter Valid Doctor ID Doctor Phone Number
Missing")
        txtID.BackColor = System.Drawing.Color.Red
        txtID.Text = ""
        txtID.Focus()
    ElseIf pname = "" Then
        lblAlert.Hide()
        btnConfirm.Hide()
        btnBack.Hide()
        txtName.Hide()
        Label4.Hide()
        Label2.Hide()
        txtHPNum.Hide()
        Shape1.FillColor = System.Drawing.Color.Red
        Shape2.FillColor = System.Drawing.Color.Red
        MsgBox("Enter Valid Patient ID to continue")
        txtpatID.BackColor = System.Drawing.Color.Red
        txtpatID.Text = ""
        txtpatID.Focus()

    End If

End Sub

Private Sub btnConfirm_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnConfirm.Click
    Dim cmdSendData As New MySqlCommand("SELECT * FROM
patint_details WHERE tagid_patid = '" & txtpatID.Text & "'",
cn1)

    Dim Message As Object
    Dim pname As String = ""
    Dim icnum As String = ""
    Dim doa As String = ""
    Dim diagnosis As String = ""
    Dim age As Integer
    Dim callno As String
    'Dim Details() As String
    'Details = cmdSendData()
    cn1.Open()
    'rdrDetails = cmdDetails.ExecuteReader
    rdrDetails1 = cmdSendData.ExecuteReader

    While rdrDetails1.Read
        pname = rdrDetails1.Item("name")
        icnum = rdrDetails1.Item("ic_num")
        doa = rdrDetails1.Item("dateofadmin")
        diagnosis = rdrDetails1.Item("diagnosis")
        age = rdrDetails1.Item("age")
    End While

    rdrDetails1.Close()
    cn1.Close()

```

```

        Message = " ATTENTION The Patient: " & pname & " Age "
& age & " Id Number " & icnum & " Admitted on " & doa & "
Diagonised with " & diagnosis & " Temperature is Critical "

        LblAlert.Text = Message
        LblAlert.Visible = True
        callno = txtHPNum.Text

        MSComm1.CommPort = 16 'switch on the port, change
accordingly with your PC
        MSComm1.PortOpen = True

        Shape1.FillColor = System.Drawing.Color.Blue
        Shape2.FillColor = System.Drawing.Color.Blue
        MSComm1.Settings = "9600,n,8,1"
        MSComm1.Output = "AT+CMGF=1" & vbCrLf
        MSComm1.Output = "AT+CMGS=" & Chr(34) & callno &
Chr(34) & vbCrLf
        MSComm1.Output = Message & Chr(26)
        MSComm1.PortOpen = False

        MsgBox("Message Sent")
        'ConnStart.Enabled = True
        'Me.Close()
        LblAlert.Hide()
        btnConfirm.Hide()
        btnBack.Hide()
        txtName.Hide()
        Label4.Hide()
        Label2.Hide()
        txtHPNum.Hide()
        Shape1.FillColor = System.Drawing.Color.Red
        Shape2.FillColor = System.Drawing.Color.Red

    End Sub

End Class

```