UNIVERSITI TEKNIKAL MALAYSIA MELAKA

REMINDER SYSTEM INTEGRATED WITH GSM TECHNOLOGY FOR HOSPITAL PURPOSES

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor‟s Degree in Electronics Engineering Technology (Telecommunications) (Hons.)

by

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TAJUK: **Reminder System Integrated with GSM Technology for Hospital Purposes**

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I hereby, declared this report entitled "Reminder System Integrated with GSM Technology for Hospital Purposes" is the results of my own research except as cited in references.

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Date	:	14 JANUARY 2015

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for Bachelor‟s Degree in Electronics Engineering Technology (Telecommunications) (Hons.). The member of the supervisory is as follow:

……

(Project Supervisor)

ABSTRAK

Sistem peringatan ini yang diaplikasikan dengan teknologi GSM direka untuk kegunaan pihak hospital. Sistem peringatan digunakan di dalam bilik-bilik pesakit untuk tujuan pemantauan masa pesakit makan ubat mengikut syarat yang telah ditetapkan dan juga untuk memudahkan pesakit mendapatkan bantuan daripada jururawat. Kelebihan sistem ini bukan sahaja memberi manfaat kepada jururawat malah untuk memastikan pesakit dapat memanggil jururawat dengan cepat. Selain daripada itu, meringankan beban kerja jururawat yang menjalankan tugas. Kajian ini bertujuan bagi mengetahui bagaimana cara yang paling berkesan untuk membuat memberikan ubat kepada pesakit dan juga cara untuk memudahkan pesakit mendapatkan bantuan daripada jururawat. Aplikasi sistem peringatan projek ini terbahagi kepada dua komponen penting iaitu butang tekan ubatan dan butang tekan untuk kecemasan.Bagi kegunaan butang tekan ubatan, sistem ini berfungsi setelah pesakit makan ubat yang diberikan oeh jururawat dan kemudiannya pesakit perlu menekan butang tekan. Selepas itu, jururawat akan dapat pesanan ringkas yang menggunakan aplikasi GSM untuk memberitahu kepada jururawat bahawa pesakit itu telah makan ubat. Seterusnya butang tekan kecemasan pula direka untuk pesakit mendapatkan bantuan daripada jururawat yg bertugas jika memerlukan. Pesakit akan menekan butang tekan itu dan kemudiannya jururawat akan datang untuk menghulurkan bantuan. Sistem ini memberi kemudahan untuk jururawat memantau masa pesakit makan ubat dan juga meberi kemudahan kepada pesakit untuk mendapatkan bantuan jururawat dengan mudah dan cepat.

ABSTRACT

A Reminder System Integrated with GSM technology is designed for application in hospitals. The reminder system will be used in the patients' rooms in hospitals and will be monitored by the nurse. Advantages of this system are it will not only benefit the nurses by easing their workload, it also makes it easier for patients to contact the nurse. This research is aimed to find out how to effectively monitor patients' medicine consumption, besides improving patients' facilities in the hospital. Application of this reminder system consists of two parts of the main component, whereby one will be used by the nurse and the other for the benefit of the patient. How the system operates is firstly, after the patient has taken the medicine, he/she needs to push the button. Hence, the nurse gets the Short Message Service (SMS) through GSM network informing as such. Secondly, the system will serve as an emergency button. Whenever the patient needs help or assistance from the nurse, he/she will just need to push the emergency button and the nurse on duty will immediately get the message. This system provides for the nurse to monitor a patient's consumption of medicines at the right time and also for the patient to be able to easily pursue help from the nurse.

DEDICATION

To my beloved parents,
Late Mahamad bin Abdul Kadir and Wan Fatimah binti Wan Ismail
To my step father,
Hussin bin Daud
To my siblings,
Asrul Bahaiqie, Anis, Alwani
To my helpful friends,
Muhammad Asyraf, Nur Liyana, Nuraini Fatihah,
To all my course mates,
4BETT 2014/2015

Thank you for always with my side along to complete this journey, I very appreciate with your support and help.
Thank you for all the memories.

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First and foremost, I feel grateful for being able to finish and complete the final year report 2 entitled “Reminder System Integrated with GSM Network for Hospitals” based on the terms and requirements given by the department of faculty.

I also would like to take this opportunity to give a big thank you to my supervisor Mrs. Eliyana binti Ruslan who has helped and gave a lot of advice to me throughout the preparation and completion of this final year report 2. Without her knowledge and guidance, I would not be able to learn more about this project and gain more knowledge from it. She has been a great supervisor as well as a wonderful lecturer.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

GSM	-	Groupe Speciale Mobile
GSM	-	Global System for Mobile Communication
SMG	-	Special Mobile Group
GPRS	-	General Packet Radio Service
EDGE	-	Enhanced Data rates for GSM Evolution
HSDPA	-	High-Speed Downlink Packet Access
TDMA	-	Time Division Multiple Access
FDMA	-	Frequency Division Multiple
ITU-T	-	International Telecommunication Union
ISDN	-	Integrated Service Division Network
CDMA	-	Code Division Multiple Access
LED	-	Light Emiting Diode
PC	-	Personal Computers
CPU	-	Central Processing Unit -
PIC	-	Peripheral Interface Controller
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
USART	-	Universal Synchronous Asynchronous Receiver Transmitter
LCD	-	Liquid Crystal
SPST	-	Single Pole Single Throw
A/D	-	Analog to Digital
DC	-	Digital Converter
V	-	Voltage
R	-	Resistor
I	-	Current

CHAPTER 1
INTRODUCTION

This chapter briefly discusses on the project background, the problem statement, its objectives as well as the scope of this project. Last but not least, the project‟s significance which outlines benefit that can be derived from the outcome of this project.

1.1 Background

A Reminder System can be defined as a system used to aid the memory and to remind a person of something that needs to be done. Thus, the main idea in the design of the Reminder System for Hospital Application is to remind the patient about the medicine‟s consumption and also to call the nurse in cases of emergency. Poor compliance for medication has become a current problem in every country. It shows that the patients‟ is usually difficult to follow the schedule and prescription of medicines in hospitals. It follows that poor compliance of the medication will cause some problems such as worsening of the disease thereby an increase in healthcare costs.

One of the common reasons for lack of compliance medication which is patients‟ is forgetfulness. Hence, the introduction of this system will help eliminate the problem of forgetfulness in patients. This system also enables patients to call the nurse when they have an emergency situation or in need of help from the nurse. This will facilitate patients who are unable to get out of bed, for instance, those with serious health condition and require intensive care.

The system provides for easy communication between the nurse and the patient. In addition, this system also benefits in that the button can also be used by the hospital staff or visitors who happens to be with the patient to call for help on behalf of the patient, should the need arises.

1.2 Objectives

The objective of this project is to:

a. study and enhance the application of the GSM network.
b. investigate each of the project application functionality.
c. find out how to take care patients‟ medicine consumption and also for improving patients‟ facilities in the hospital.
d. design the implementation of the Reminder System integrated with GSM network for hospital application.

1.3 Scope

Basically, the scope of this project is focused on the GSM networking. The GSM networks send the messages without connection in transmission. It uses only the signaling channel which the mobile radio user can receive messages even thoughuser on call. Secondly, the project is focused on the functionality of the so-called medicine button and the emergency button.Next, the project calls for the need to design and construct the circuit by using Proteus Software, Isis 7 Professional and Protel software. In addition, there is also need to study and implement PCW software of GSM modem. Finally, the need to create the coding in order to make sure the circuit functions properly.

1.4 Project Significance

The Reminder System project is deemed beneficial for application in hospitals especially focusing on the connection and communication between nurses and patients in the hospital. This project will help facilitate the communication between the nurse and the patient, improving the overall efficiency of hospital services besides making the patients feel more comfortable whenever they have to stay in hospitals.

Using the GSM networks, the nurse can simply monitor the patient through the mobile phone when the patient pushes the medicine button. On the other hand, the emergency button will give a signal alert at the nurse station whereby the buzzer sound is expected to attract the attention of the nurse or other staff of the hospital who happen to be around or nearby the patient‟s room to come and attend to the patient as immediately as possible. Apart from that, any visitors who happen to be in the vicinity can call for help on behalf of the patient by using those buttons.

CHAPTER 2
LITERATURE REVIEW

In this chapter, reviews of researches which are related to this project will be discussed. It will describe details about literature review on the parts and systems used in the project. In addition, it will include explanation of the component characteristics and the particular component chosen for this project.

2.1 Project Review

This chapter covers review on the existing product that has been used in the industry. The project review is to illustrate that my project on Monitoring System Integrated with GSM Network for Hospitals is not similar with the others existing products that have been researched.

2.1.1 Remote Monitoring System Based on GSM Network

Based on this journal, it is about the medical monitoring system through the GSM which was implemented in remote for family medical monitoring network. This system isconnected with user terminal equipment, GSM network and hospital terminal equipment. This system illustrates the advantage of powerful GSM network by applying the remote communication in the form of short messages.

Nowadays, regular medical check-up will need a substantial amount of time and effort to queue in the hospital. In addition, doctors or staff in the hospital cannot immediately diagnose the patient‟s condition which will make the situation worsebecause of their limited time and space. Taking this into consideration, the remote medical monitoring system was produced which allow patients to measure some major physiological indicators at home and pass the related parameters to the doctors. The patients can collect several physiological parameters such as heart rate, blood pressure and the temperature in aid of GSM network at home.

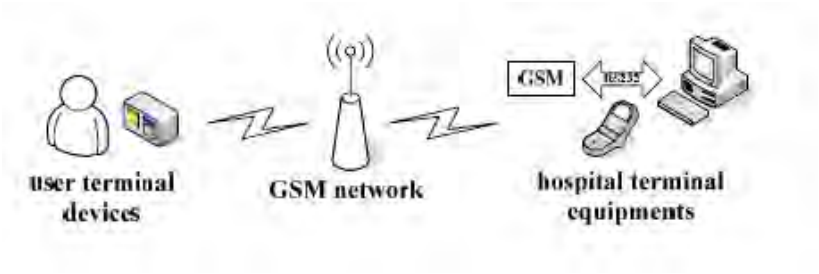

Figure 2.1: Outline of the System

The Figure 2.1 shows the outline of the system where the user terminal equipment functions to collect various physiological parameters. Next, all the information that has been collected by the patients will be transmitted to the hospital through GSM network. This will allow the professional medical staff to always keep update on the data and do the analysis on the terminal equipment. Lastly, the staff should give feedback information to the user by using the GSM network.

In addition, FPGA is the core design which control and collect the blood pressure and heart rate parameters. After that, GSM module is used to send the related information under the control of FPGA via UART2 so that the remote transmission of the physiological parameters is implemented. Siemens TC35 is adopted as the core of the GSM module. FPGA is connected with GSM module and is controlled by serial communication interface UART2. Siemens TC35 provides the users standard AT command interface to transmit the data, audio, short messages and other as shown in the Figure 2.2 below.

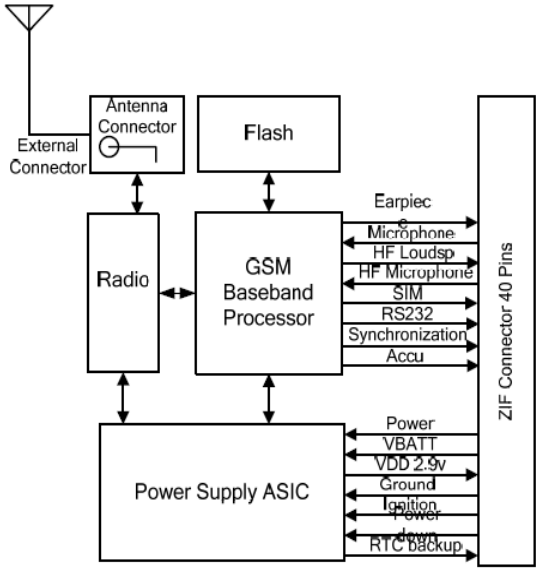

Figure 2.2: The Block Diagram of the GSM TC35

2.1.2 Home Patients Monitor

This project is about the Home patients Monitor. It is designed in portable size and can be carried anywhere such as at home, office, school or other desired places. It is used to measure the heart rate, blood pressure and body temperature. The important component in this project is the microcontroller which is PIC16F887A microchip. PIC16F887A was used because it can be re-programmed by using the flash memory.

Then, the relay is used for switching purposes to control the motor on the blood pressure circuit. The relay consists of three pins, the change-over, normally-open and normally-closed respectively. The LM35 temperature sensor is apply in this project for check the body temperature of the patients. The LM35 features are low output impedance, linear output, and precise inherent calibration that makes interfacing to read out or control circuit easily.

The home patient monitor works in such a way that the signal will be amplified and then analogue signal will be sent to the digital converter (ADC) to produce digital signal. In addition, the interface hardware with software MAX 232 is used besides a

USB converter. The MAX232 is an integrated circuit that converts the signals from RS232 serial port to the signal with the suitable TTL compatible digital logic circuit. The MAX232 is a dual driver or receiver and usually convert the receiver and transmitter signal. The Figure 2.3 and Figure 2.4 show the progress circuit for this project.

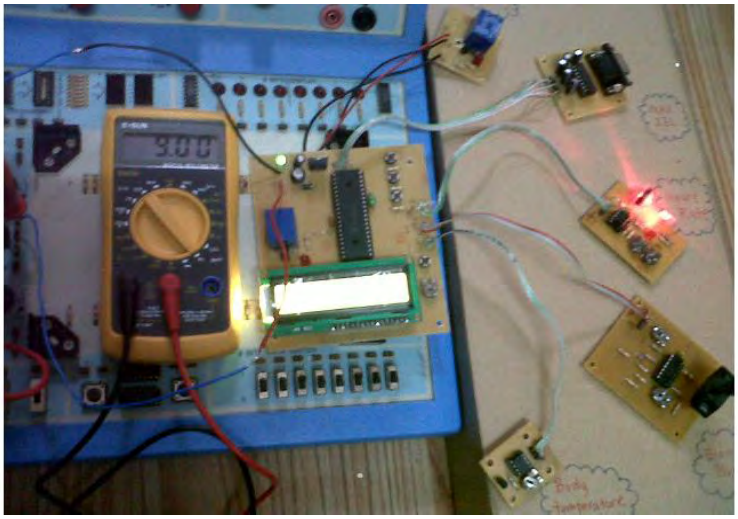

Figure 2.3: The Combination of All Circuit

Figure 2.4: The Circuit Functions Well

2.1.3 Differences between My Project and the Two Previous Projects

Table 2.1 below shows the differences between my project and the other two existing projects that have been explained and elaborated above. As can be seen, the differences focus on the projects‟ applications, the network used and the specialty between the projects.

Table 2.1: Differences between Previous Projects and My Project

	Remote Monitoring System Based on GSM Network	**Home Patients Monitor**	**Monitoring System integrated with GSM network for hospital purposes.**
Uses	Remote for family medical monitoring network	Used for patients to monitor their health status at home. It is in portable size	Used in hospitals to monitor patients.
Network	GSM network	no	GSM network
Specialties	To measure the physiological parameters such as heartbeat, blood pressure and the temperature with the aid of GSM network at home.	To measure the blood pressure, body temperature and heartbeat.	Have a medicine button for the medicine consumption and a emergency button for patient to call the nurse/staff

From the Table 2.1 above, it can be seen that both the existing products are not similar with my project. The other two projects are meant primarily for patients to use at their homes for monitoring their health. My project on the other hand, is for use in hospitals which benefits both the staff in the hospital and the patients. It is therefore safe to conclude that the project of Monitoring System with Integrated with GSM Network for Hospitals Purpose is not an existing product.

2.2 Group Special Mobile (GSM)

Nowadays, telephone is the one of the fastest growing in telecommunication application or gadgets. In 1982, the Nordic Postal, Telephone and Telegraph administration (PTT) have prepared the proposal which is to specify a common European telecommunication service at 900MHz. The proposal is sent to the Conference Europeenne des Administration Postes Et des Telecommunications (CEPT). After that, GroupeSpeciale Mobile (GSM) is established to convey the specifications for pan-European mobile cellular radio system. In March 1989, GSM have been taken by ETSI and called as a Special Mobile Group (SMG) in 1991. But today, GSM is stands for Global System for Mobile Communication as a worldwide standard. (Stuckmann, 2003)

Global System for Mobile Communications network is the most popular universal mobile communication network. GSM is the main mobile phone standard in more than 100 countries and start implement it in Europe since 1991. After that, it spread to all Asia, Africa and the Pacific Rim such as Australia and also New Zealand.(Team, 2004)

The GSM system allows people to easily communicate with each other. TheGSM family networks are General Packet Radio Service (GPRS), Enhanced Data rates for GSM Evolution *(*EDGE) and High-Speed Downlink Packet Access (HSDPA) networks. In addition, the GSM system also is the combination between Time