

“ I hereby declare that I have read through this report entitle “*Notification System for Medicine Kit Using GSM Development*” and found it has comply the partial the fulfilment for awarding the degree of *Bachelor of Electrical Engineering (Control, Instrumentation and Automation)*”

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**NOTIFICATION SYSTEM FOR MEDICINE KIT USING GSM
DEVELOPMENT**

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**A report submitted in partial fulfilment of the requirements for the degree of
Bachelor of Electrical Engineering**

**Faculty of Electrical Engineering
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2013

I declare that this report entitle “*Notification System for Medicine Kit using GSM Development*” is the result of my own research except as cited in references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Dedicated to my beloved family especially my father and mother, lecturer and friends

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ABSTRACT

The evolution of mobile phone used in telecommunications technology dramatically growth according to creative and innovations. This technology has diversified efforts to improve the quality of human life and one of the applications for the use of mobile phones was as a notification device. In this project, a notification system for medicine kit by using *Global System for Mobile Communication* (GSM) technology is developed which is aimed to help patients comply with their medication schedule. This project includes the designing of a prototype which consist of hardware, software and circuit development. This project used GSM and mobile phones as communication device. The mikrocontroller PIC 16F877A used for controlling the circuit operation. The type of the operation will be programmed into the PIC so that the signal will transmit by GSM to mobile phones via *Short Message Service* (SMS). Thus, patients will be reminded by a SMS comply their medicine schedule and at the same time an indicator and buzzer on their medicine kit will be activated. If there is no action from the patient after notification sent, another SMS will be sending to their family members again. This system is capable of assisting patient to obey with their medications schedules consistently thus avoiding patients/users suffer from others complications due to improper medication comply. It will help to increase patients/relative awareness to keep healthy lifestyle by using this system.

ABSTRAK

Pertumbuhan perkembangan telefon bimbit yang digunakan dalam teknologi komunikasi meningkat secara mendadak mengikut kreatif dan inovasi. Teknologi ini telah mempelbagaikan usaha – usaha untuk meningkatkan kualiti kehidupan manusia dan salah satu aplikasinya adalah sebagai alat pemberitahuan. Dalam projek ini, satu sistem pemberitahuan untuk peti perubatan dengan menggunakan Sistem Global untuk Komunikasi Teknologi Telefon Mudah Alih (GSM) diwujudkan bertujuan untuk membantu pesakit mematuhi jadual pengambilan ubat mereka. Projek ini melibatkan rekabentuk prototaip yang terdiri daripada perkakasan, perisian dan pembangunan litar. Projek ini menggunakan GSM dan telefon bimbit sebagai alat komunikasi. Pengawal mikro PIC 16F877A digunakan untuk mengawal operasi litar. Jenis-jenis operasi akan diprogramkan ke dalam PIC supaya menghantar pemberitahuan melalui GSM ke telefon bimbit melalui Khidmat Pesanan Ringkas (SMS). Oleh itu, pesakit akan diingatkan oleh SMS mengenai jadual ubat mereka dan pada masa yang sama penunjuk dan penggera bunyi pada peti ubat akan diaktifkan. Jika tiada tindakan daripada pesakit selepas pemberitahuan dihantar, satu lagi SMS akan dihantar kepada ahli keluarga mereka. Sistem ini mampu membantu pesakit mematuhi jadual pengambilan ubat-ubatan mereka secara konsisten sekali gus mengelakkan pesakit/pengguna daripada menghadapi komplikasi lain akibat pengambilan ubat yang tidak sekata. Projek ini juga membantu meningkatkan kesedaran kepada pesakit/saudara untuk menjaga gaya hidup sihat.

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LISTS OF ABBREVIATIONS

FYP	–	Final Year Project
SMS	–	Short Message Service
GSM	–	Global System for Mobile Communication
PIC	–	Peripheral Interface Controller
AT Command	–	Attention Command
OS	–	Operating System
LCD	–	Liquid Crystal Display
LED	–	Light Emitting Diode
USB	–	Universal Serial Bus
PC	–	Personal Computer
SIM	–	Subscriber Identity Module
PCB	–	Printed Circuit Board
UV	–	Ultraviolet

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CHAPTER 1

INTRODUCTION

1.1 Project Background

Current technological development mostly designed to bring convenience to people. The highest technological level brings people more easily in life and the impact to this revolution, they being passive and exposed to various diseases. The diseases may occur by a few factors such as dietary, work environment, lack of exercise and life style. The development of this technology also applied in healthy field. **“Notification System for Medicine Kit using GSM Development”** is one of the implementation for application in GSM technology. The GSM network operates firstly in 1991, where the world adopted it as a standard for mobile communication. After a few years, it become wider in nation and developed until has capability in Short Message Service (SMS). SMS technology growth as a part of communication especially for reminder, notification and a short note when user is not expect to answer or respond immediately. Through modernity in present life where people less active and exposed to bad lifestyle, the purpose of SMS can be implementing as a reminder or notification in health field focusing for old patient suffering from various chronic diseases. This will help patient or senior citizen or anyone who have a tight medicine schedule to improve their health and lifestyle. This device useful to inform patients about their medicine time accordance to the current situation where most people are busy in their daily works.

1.2 Problem Statement

Seniors citizen are categorized as people aged over 60 years of age. Some of them suffer from chronic diseases and need attention and affection that require them to take medication more than one type in a day for their whole lives. Discipline in following medication schedule can stabilize blood pressure and maintain the condition of their health. Hence, a method or device that can help patients or the senior citizen to remember their medicine schedule or alert them about time of medication schedule is very necessary.

An unhealthy lifestyle simplifying person be diagnosed with the disease in old age because our body not as strong as in the younger time. A balanced diet and discipline in a consistent medication schedule is very important to avoid other complications occur. Failure of patient to comply with medication schedules can cause them turn to serious disease. The major factors behind this situation is a patient attitude that not concerned or difficult to remember with their medicine schedule and no one notified them to take the medication.

So, the devices that can help to inform patients about their medicine time have been designed. This system introduced accordance with the current situation where most people are busy with their daily work makes them forget about their personal health. Beside, this device suitable for patients who have dementia or senile which is one of disease commonly affects their ability to remember important events or things in their daily life.

1.3 Objective of the Project

The objectives of this project are:

1. To develop a system using GSM development for sending a notification by short message service (SMS) to the relative patient.
2. To design a system that can automatically send an SMS repeatedly according to the user requirement.
3. To analysis the performance of the prototype in terms of functionality and processing time.

1.4 Scope of the Project

The scope of limitation of the project to ensure the achievable and realistic according to the objectives are described as follows:

1. The system placed in the house or building.
2. In one operation SMS will be sent by the system, one for medicine time and another after cover box open.
3. The project requires the use of Global System for Mobile Communication (GSM) module and cell phones.
4. Using PIC 16F877A as a controller to control the circuit operation.

1.5 Summary of Chapter

Chapter 1 discuss about project background, problem statement, objective and scope of the project. At the end of this chapter, it states a summary of each chapter in this report. In Chapter 2, it will focus more on literature review correlated to project title. The information was gain from articles, journal and other related sources that can help in this project. Methodology part will cover in Chapter 3 where it explains a step by step to construct this project where covers for test circuit, programming and troubleshooting. Result for Chapter 4 from the hardware observation and operation are explained. Besides, the standard of procedure how to use prototype listed. A result analysis discuss on Chapter 5, where including the simulation, precaution of project, product comparison and budget. In Chapter 5, it consists of conclusion of the project, achievement, recommendation and suggestion for a future improvement that can applied for this project.

CHAPTER 2

LITERATURE REVIEW

This chapter is discusses on collecting the data to be analysed and synthesized in order to gain more knowledge and understanding the existing project or previous project that similar to this project.

2.1 Global System for Mobile Communication

“Notification System for Medicine Kits using GSM Technology” is a system which implements a Global System for Mobile Communication (GSM) technology. After a few years GSM network started, the world adopted it as a standard for mobile communication. The adoption become wider in nation until has capability to develop SMS service. SMS technology then accepted as a part of communication popular in term of notification or short note to user who is not expecting to answer or respond immediately.

GSM operating in several frequency bands such as 900 MHz, 1800 MHz, 1900 MHz and 2100 MHz where depends on it memory cards called Subscriber Identity Module (SIM). The identity number for each GSM modem is different to make sure the information is secure and delivered to the right number. The messages service is one of the functions with low cost and high reliability compared to carrier wave communication, fibre optic communication and lead-in microwave. Other advantages for GSM are the transmitting capability, enlargeable and easy to maintain. Besides, it also has disadvantages such as delay for sending message during peak time. The network will save the message in case a failing transmission to send the message.

A GSM used for hardware called GSM module or GSM modem. There are a lot of types for GSM module on market currently. It specialized as a type of module which is accepts a SIM card and operates over a subscription to a mobile phone. A main function of GSM module is only to send and receive the short messages [2]. This modem can be

operated with micro-controller by means of straight-forward commands [3]. This module is simple to install and higher security from fraud or tempering.

The interface provides the users a standard AT command to transmit the data, audio, short messages, reliability and safely. The longest distance the GSM specification supports in practical use is 35 kilometres [4]. AT commands are used to automatically receive the call on the system from the preconfigured number [5]. Table below shows the description AT commands set.

Table 2.1: Description of AT Command Set [5][6].

COMMAND	DESCRIPTION
AT	Check if serial interface and GSM modem is working
AT\$AREG=0	To turn off the automated GSM registration feature
AT+COPS=0	Select network operator for registration
AT+CGATT=1	AT command to the ATTACH sequence
ATD<number>	Dial to a number
AT+CMGD=1	Delete unauthorized SMS
AT+CMGF=1	Set message format to TEXT mode
AT+CMGS= "number"	Send a message to the telephone number
AT+CMGR=1	Read authorized SMS

2.2 Project Operation

Planning operation for this project start from the timer setting for medicine schedules such as within 8 hours, 12 hours and 24 hours. When timers reach a time setting, it will give a signal to switch on the buzzer and indicator, i.e. LED as a reminder system. At the same time, microcontroller will send SMS through GSM modem to remind user to take the medicine. The buzzer and indicator will always on until user open the medicine box. Once user open the medicine box, the buzzer and indicator will turn off and at the same time, another SMS will send mention that patient already taking the medicine. Figure 2.1 below shows the block diagram of the project operation.

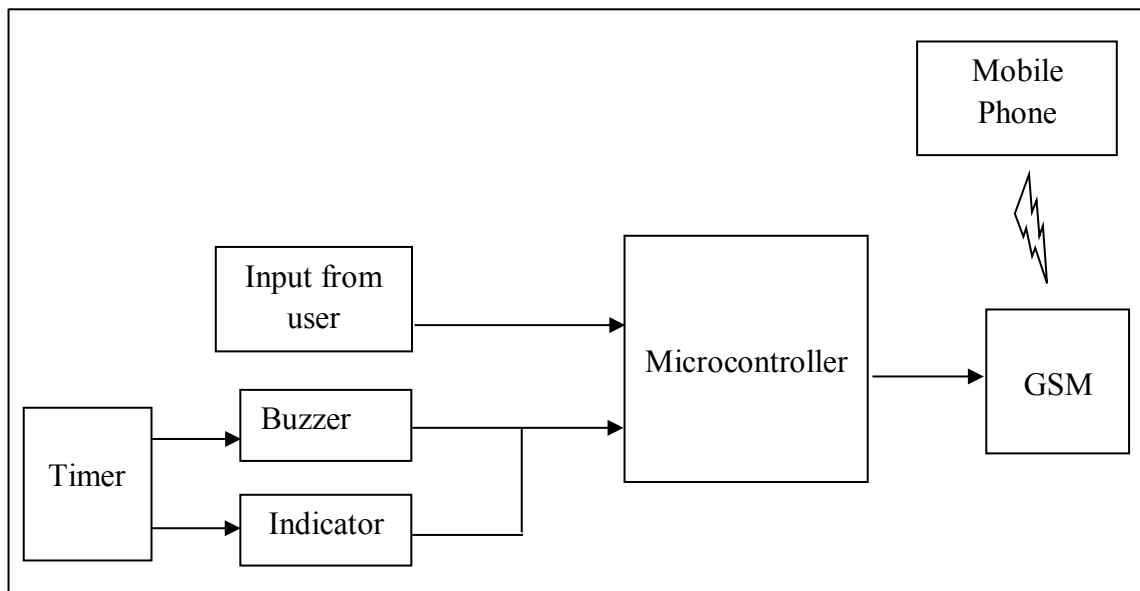


Figure 2.1: Block Diagram of the Project

2.3 Mikrocontroller

The mikrocontroller is a main part for this project. It just likes a computer on a single integrated circuit containing a processor core, memory and programmable input/output peripherals. The mikrocontroller was widely used especially in automatically controlled devices such as in a remote control, office machines, appliances and other embedded systems. The program on the mikrocontroller depends on the programming of the project. Figure 2.2 illustrates the block diagram of the home appliances control system using SMS.

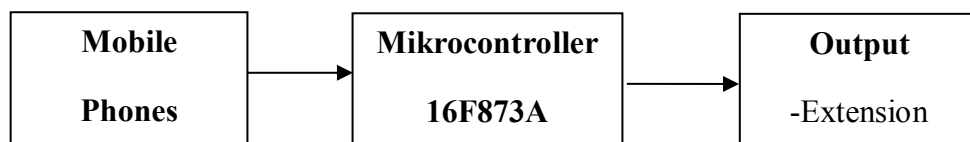


Figure 2.2: Block Diagram of the Project for Smart Home Application [7]

The mobile phone is integrated with the mikrocontroller that functions to receive SMS from user and sends a command to PIC to control whether to turn ON or OFF the output [7]. Besides, mobile phones also can send status reporting to the user regarding the electrical appliances. The development of this device involves with both hardware and software to provide a preferable results [7]. In PIC itself, there have a few port that user can determine to use it as input or output port based on the other connection for the project. For example, a familiar PIC used for a project from f-family types such as 16F877A. This type of PIC seems to be efficient and cost effective for a project implementation.

2.4 Software Required

Software part usually used in any application as a monitoring system. One of the software programming used is MPLAB v 8.0 [5]. This consists of Hi-tech C as a compiler that can be used to program in C language. By using PIC kit as a mikrocontroller, MikroC compiler more suitable because it used easier declaration for programming to connect it with hardware part. Besides, it used simple programming for connect with GSM modem.

Software such as PICKit2, Hyperterminal and Proteus also need to make sure that programming can be connected to hardware part. For PICKit2, it use to burn hex file program to PIC which user can select type of PIC use and select either to write or read the programming to PIC chip. For Hyperterminal, it used to check up GSM modem condition either it can be used to send SMS or not. Hyperterminal software similar use for user that using OS other than Windows XP.

2.5 Circuit Design

There were a few important components in hardware part used for example in the “**Smart Home Application**”. This project contains four type of different important component such as power supply circuit, microcontroller circuit, MAX232 circuit and relay 9Vdc [7]. Power supply was important to supply the power or voltage to the circuit. It consists of 9V battery, voltage regulator, LM7805 as a filter and capacitor. For this circuit, capacitor used to reduce ripple and stabilize the voltage supply to the circuit. MAX232 used as an interface between computer and receiver. Relay also used because it connected to the output for electrical operated switch. Label at relay component usually as Common (COM), Normally Open (NO) and Normally Close (NC). Relay use contacts obtained the result when its detect signal from PIC circuit.