

HOME APPLIANCES CONTROL USING GSM

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**This report is submitted in partial fulfillment of the requirements for the award
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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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**BORANG PENGESAHAN STATUS LAPORAN
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Special dedication to my loving family, all my siblings, and my kind hearted supervisor Mr. Ahmad Sadhiqin Bin Mohd Isira and also dearest friends.

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ABSTRACT

The title of the project is “Home appliances control using Global System for Mobile communications (GSM)”. The main purpose of the project is to create a system which uses GSM to control the home appliances such as lamp, fan, air condition and many more. These devices are able to be controlled by a single cell phone that acts as the transceiver module. This project can be operated by user while they are not at home by using the mobile phone remotely. The device able to control the ON/OFF switch of any device, appliances status review of overall system and perform a safety and security system. This system is reliable and highly accurate. GSM modem is the medium by which the user can interact with the module. It is used to send and receive SMS based on which appropriate actions taken by the user. PIC microcontroller performs as heart of whole controlling system. Main function of PIC microcontroller is to initiate the attached GSM module and make it ready to communicate with the home appliances by using mobile phone. The software was written using MikroC Compilers.

ABSTRAK

Tajuk projek adalah “Home appliances control using Global System for Mobile communications (GSM)”. Tujuan utama projek ini adalah untuk mencipta sebuah sistem yang menggunakan GSM untuk mengawal peralatan elektrik rumah seperti lampu, kipas angin, penyaman udara dan banyak lagi. Alat ini dapat dikawal oleh telefon bimbit yang bertindak sebagai modul transceiver. Sistem ini boleh dikendalikan oleh pengguna apabila mereka tiada di rumah dengan menggunakan telefon bimbit. Sistem ini mampu mengendali “ON / OFF” peranti, meninjau status peralatan secara keseluruhan, serta mampu memberi keselamatan dan keamanan kepada pengguna. Sistem ini boleh dipercayai dan sangat tepat. Modem GSM adalah media bagi pengguna untuk berinteraksi dengan modul. Ia digunakan untuk menghantar dan menerima SMS berdasarkan tindakan yang tepat yang diambil oleh pengguna. PIC mikrokontroler adalah jantung keseluruhan sistem pengendalian projek ini. Fungsi utama mikrokontroler PIC adalah untuk memulakan modul GSM untuk bersedia berkomunikasi dengan peralatan elektrik rumah dengan menggunakan telefon bimbit. Perisian dalam projek ini ditulis dengan menggunakan MikroC Compiler.

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LIST OF SYMBOLS AND ABBREVIATIONS

PIC	-	Peripheral Interface Controller
GSM	-	Global System for Mobile communications
LED	-	Light Emitting Diode
PCB	-	Print Circuit Board
SMS	-	Short Message Service
IR	-	Infrared
RF	-	Radio Frequency
DC	-	Direct Current
PC	-	Personal Computer
DEC	-	Digital Equipment Corporation
DCE	-	Data Communication Equipment
CD	-	Carrier Detect
RD	-	Receive Data
TD	-	Transmit Data
DTR	-	Data Terminal Ready
SG	-	Signal Ground
DSR	-	Data Set Ready
RTS	-	Request to Send
CTS	-	Clear to Send
RI	-	Ring Indicator
ADC	-	Analog to Digital Conversion

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CHAPTER I

INTRODUCTION

1.1 Introduction

Global System for Mobile communication (GSM) has been one of the popular and reliable wireless communication systems which is accessible and user friendly. Cost, is one of the factor highly concern with market survey, survey result shows cost effective the price of its transceiver module (a simple cellular phone) or the subscription fees. With the trend of huge growing usage of GSM during the past decade, network services are extended beyond speech communication to many other custom specified applications, machine automation and machine-to-machine communication. [1]

The project was based on the principle of GSM network, which enables the user to remotely control the operations of the appliances by using a mobile phone. In other words, it would transform a normal home into an intelligent home. The controlling circuit is the most important component in communication and interface between home appliances. It was implemented by using Peripheral Interface Controller (PIC) interfaced to mobile phone. The user can perform ON/OFF operations of the appliances just by pressing keypad of mobile phone.

The user sends GSM data in the form of SMS (short message service) message to switch ON or OFF any appliance at home such as lamp, air condition, fan

and etc. The appliance may also provide the user with its current ON/OFF status. The system can be improved to provide the user with information about the status of each appliance.

A sketch of overall design of the home appliances control using GSM is shown in Figure 1.1.

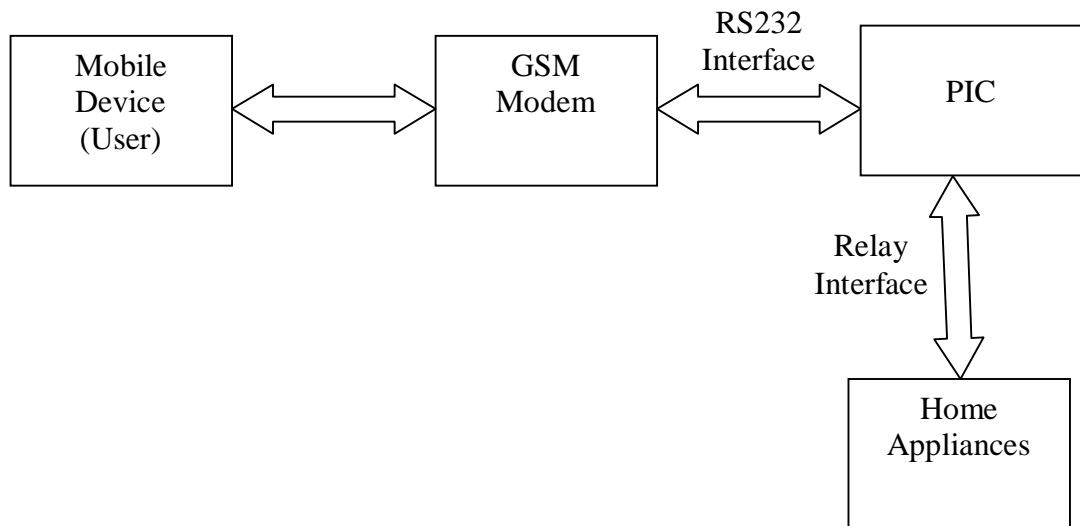


Figure 1.1: Simplified block diagram of home appliances control using GSM

1.2 Project Objectives

The objective of this project as follows:

- i. To design and develop Home Appliances Control System over GSM network by using a mobile phone.
- ii. To determine and understand on how the GSM works.
- iii. To understand the architecture and programming of the PIC.
- iv. To interface the GSM modem with the PIC.
- v. To learn the troubleshooting and techniques.

1.3 Problem Statement

The most basic controlling device must have at least a switch. A few decades ago, controlling devices using remote control switches like infrared (IR) and Radio Frequency (RF) were already popular but these technologies have their own limitations and bandwidth. Some technologies like IR remote control are only used for short distance applications.

In case of users going oversea or outstation, the remote control technology using IR and RF is not suitable due to range limitation. In other word, user is unable to control the appliances if user not at home. For example, user cannot randomly turning lights on and off. Hence, it may enable thief to break into their homes. Furthermore, the user may waste lot of energy by not switching off the appliances when not in use.

Hence, this project is designed and developed to overcome these problems. A success project may help the user control their appliances at home by using the mobile phone. To be precise, this project will enable the user to control the ON/OFF of the devices, with a single push of a button or a few more. It will also enable the user to check the appliances status from time to time.

1.4 Scope of the Project

The scopes of works in this project are:

- i. Mobile phone with SIM card enables the user to remotely control the operations of the appliances by communication to the GSM modem.
- ii. GSM modem allows the capability to send and receive SMS to and from the mobile phone.
- iii. RS-232 is the basic serial communication cable that will be used to interface between GSM modem and PIC microcontroller.

- iv. PIC microcontroller will be interfaced to the control circuit that is connected to the appliances. It contains the software components through which the appliances are controlled and monitored.
- v. C programming language is desired for the system's program. The program is then compiled and executed before completed.
- vi. Power circuit provides DC power supply through voltage regulator 7805 to 5 volt.
- vii. Relay and control circuit used to detect and control the condition of the home appliances.

1.5 Methodology

Based on the flowchart from Figure 1.2, the project starts by discussing several possible topics with the supervisor. After a topic has been selected, additional discussions were done in order to understand the concept and objective of the project. Then, literature review was done and the background of this project was studied by referring to various sources such as journals, articles, reference books, internet, lecture notes and data sheets. All the information related to components, GSM and PIC was searched and the most suitable would be selected to be used in this project.

The C programming is studied, developed, simulated and executed. The software design includes interfacing between mobile phone, GSM modem, control circuit, PIC and home appliances.

The next step is hardware design, assembly of components will be carried out in stages, and devices will be connected to one another to form the complete system. The wire connection for the system is determined and control circuit for this system will be design in this stage.

The system is ready for experimental testing now. The hardware should be able to communicate with the mobile phone used in this system. The functions of each device are tested.

In the redesign and troubleshooting, any problem facing, defects or inadequacies and improvement required are fed back to the previous stage. Redesign and troubleshooting process will be carried out in case the output of the system is out of specification of project. This process will keep repeating until full functional test and reliability test pass. Finally, the project would have been realized and ready for presentation to panel for verification.

1.5.1 Flow Chart Diagram

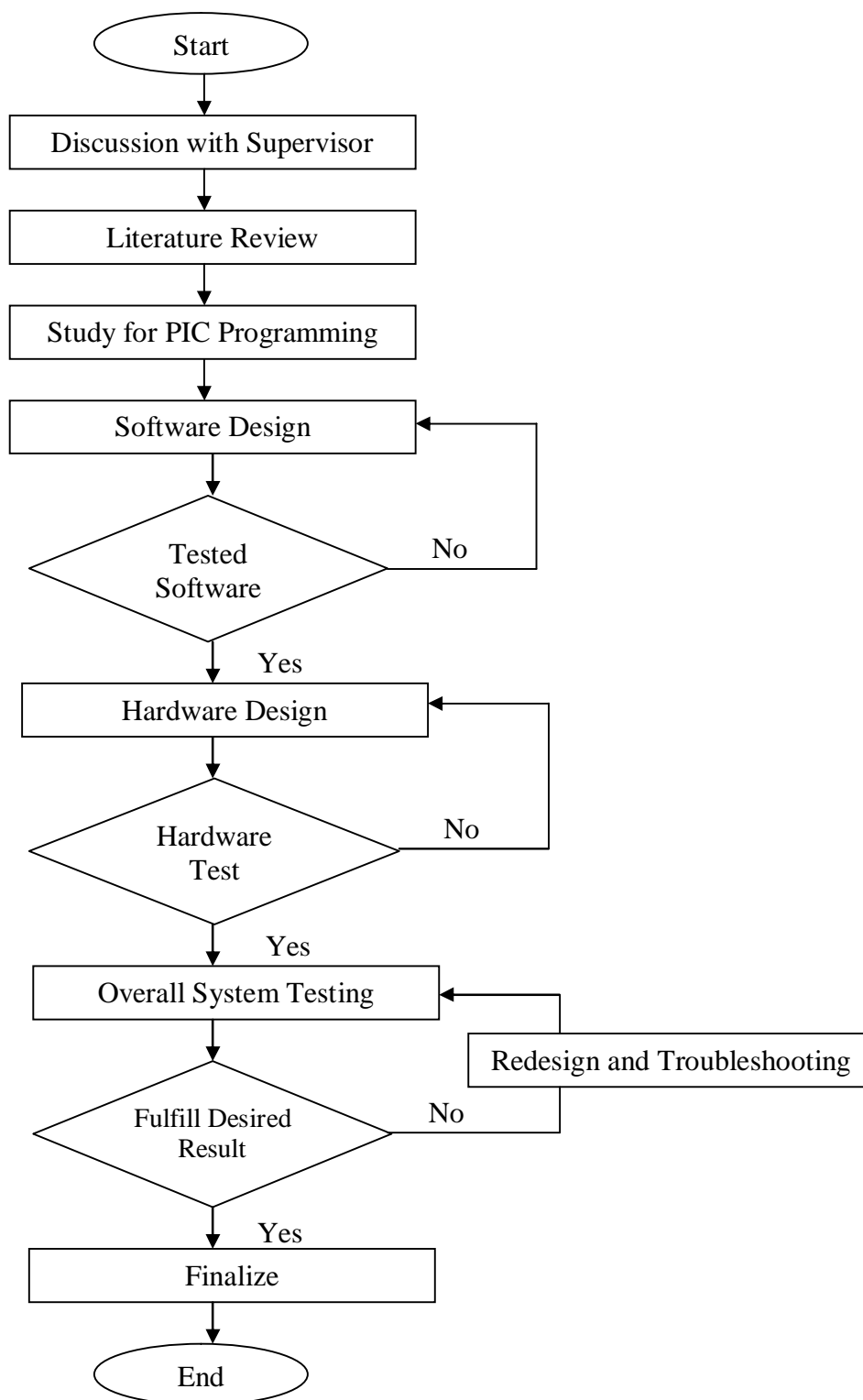


Figure 1.2: Flow Chart Diagram

1.6 Report Structure

This report consists of five chapters. Following is a chapter-by-chapter description of report.

Chapter 1 is the introduction of how the idea of this project generated. The chapter contains introduction, objective of the project, problem statement, scopes of project, brief methodology and report structure.

Chapter 2 contains the literature review on theoretical concepts applied in this project. The chapter concludes the background study of Global System for Mobile communications (GSM), PIC16F877A, RS232 interface and application of other components. This chapter also contains the theory of the components, equipments, software and programming languages that is used in the project.

Chapter 3 contains the hardware design of the project. It is mainly about the construction of the project, which involves circuit design.

Chapter 4 involves the software development of project. The chapter will discuss on interfacing device on this project by using C programming. This chapter contains the programming flow chart which describes the program flow of the software.

Chapter 5 will cover all results from the designing process to the end. The chapter concludes with discussion all outcomes of this project and the design process. The testing procedures, devices and method used to generate the expected results are also included in this chapter. This chapter will feature a few tests that have been conducted.

Chapter 6 is the conclusion of the PSM project. The chapter also includes some recommendations that can be implemented in the future.