WIRELESS INTELLIGENCE HOME SECURITY INTEGRATED WITH GLOBAL SYSTEM FOR MOBILE (GSM)

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This report is submitted partial fulfillment of the requirement for the award of Bachelor of Electronic Industry Engineering with Honours

Faculty of Electronic and Computer Engineering

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I dedicate to my family especially my mother and father who always supporting me.
Also always beside me are brothers, my nephews, lectures and all my friends.

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ABSTRACT

This project Wireless Intelligence Home Security Integrated with Global System for Mobile (GSM) was build to make sure that our residences is a safe place. This wireless burglars alarm was a wireless system which is the sensor and the control unit was connect without using wire. The wireless component that I used is RF module 433Mhz. Besides that, this project was focus on microcontroller PIC16f877A. Function of microcontroller is to control the input signal and then it will process the input to give a correct output at that time. Meanwhile, these wireless systems communicate using a radio frequency (RF) signal between sensor circuit and control unit. It also will send message to mobile phone using Global System for Mobile (GSM).

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ABSTRAK

Projek Wireless Intelligence Home Security Integrated with Global System for Mobile (GSM) dibina untuk memastikan bahawa kediaman anda adalah tempat yang selamat dari penceroboh. Sistem penggera ini adalah satu sistem yang menggunakan sensor dan unit kawalan yang akan berhubung tanpa menggunakan wayar. Komponen wayarles yang saya gunakan adalah RF module 433Mhz. Selain itu, projek ini adalah lebih fokus kepada PIC16f877A mikropengawal. Fungsi mikropengawal adalah untuk mengawal isyarat masukan dan kemudian ia akan memproses isyarat tersebut untuk memberikan isyarat keluar yang betul pada masa yang sama. Sementara itu, sistem-sistem wayarles berkomunikasi dengan menggunakan frekuensi radio (RF) untuk berhubung diantara litar sensor dan unit kawalan. Ia juga akan menghantar mesej ke telefon mudah alih dengan menggunakan Global System for Mobile (GSM).

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TABLE OF CONTENT

CHAPTER	TITLE	PAGE
	DEDICATION	i
	ACKNOWLEGMENT	ii
	ABSTRACT	iii
	ABSTRAK	iv
	TABLE OF CONTENTS	ix-xi
	LIST OF FIGURE	xii
I	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Problem Statement	2
	1.3 Objectives of project	2
	1.4 Project Scopes	3
	1.5 Significant of the project	4
	1.6 Project methodology	4
	1.6.1 Determine the title.	4
	1.6.2 Make research for the circuit will be involed.	4
	1.6.3 Get component for each sub system.	4
	1.6.4 Testing the component for each sub system	5
	1.6.5 Testing circuit for each sub system	5
	1.6.6 Integrated circuit for each sub system	5
	1.6.7 Evaluation of the system	5
	1.6.8 Expected Result	5

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II	LITERATURE REVIEW		6
	2.1	Introduction	6
	2.2	Microcontroller circuit	7
	2.3	Components and equipment	7
		2.3.1 SK40C Circuit	7
		2.3.2 Global System for Mobile (GSM)	8
		2.3.3 Microprocessor 16F877A	10
		2.3.4 RF Transmitter Modules (433MHz)	12
		2.3.5 RF Receiver Modules (433MHz)	13
		2.3.6 IR LED emits infrared.	15
III	METHODOLOGY		17
	3.1	Introduction	17
	3.2	Methodology Operation	18
		3.2.1 Title Selection	19
		3.2.2 Discussion with the Lecturer about the Title	19
		3.2.3 Data Collection Method	19
		3.2.4 Analysis about the circuit and the component	19
		3.2.5 Print the circuit on PCB	20
		3.2.6 Etching Circuit	20
		3.2.7 Drilling Process	21
		3.2.8 Drill	22
		3.2.9 Installation the component	22
		3.2.10 Circuit Testing	22
		3.2.11 Soldering Process	22
		3.2.12 Steps to solder the component	23
		3.2.13 Equipment on Soldering Steps	24
		3.2.15 Software design concept	25
	3.3	Project Planning	31
	3.4	Expected result	32

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IV	RESULT AND DISCUSSION		34
	4.1	OPERATING SYSTEM	34
		4.1.1 Operating Environment	34
		4.1.2 Block diagram of project operation	35
		4.1.3 GSM Technology	36
		4.1.4 GSM provided SMS	37
	4.2	Circuit result	39
	4.3	AT commands	43
V	CONCLUSION AND SUGGESTION		46
	5.1	Conclusion	46
	5.2	Suggestion and Future development	47
VI	REFERENCES		50
	APPENDIX		51

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LIST OF FIGURE

FIGURE	TITLE	PAGE
Figure 2.1	Example of SK40C circuit.	8
Figure 2.2	Schematic for interfacing the SK40C with a GSM modem	9
Figure 2.3	Components for GSM to enable the function	9
Figure 2.4	A microcontroller based system	10
Figure 2.5	(a) The physical appearance of the programmable IC for PIC 16F877A, (b) the USB ICSP PIC programmer	11
Figure 2.6	RF transmitter module circuit	13
Figure 2.7	RF transmitter module	13
Figure 2.8	RF receiver module circuit	14
Figure 2.9	RF receiver module	14
Figure 2.10	The transmitted signal between two IR sensors.	15
Figure 2.11	Two packages IR sensor (3mm or 5mm).	15
Figure 3.1	Flow chart Methodology	18
Figure 3.2	Coding design flowchart	25
Figure 3.3	CCS compilers for PIC	26
Figure 3.4	CCS compiler progress	26
Figure 3.5	PICkit 2 start-up program	27
Figure 3.6	PICkit 2 Import Hex	28
Figure 3.7	Burn the program to the PIC	28
Figure 3.8	Toolbars illustrates	30
Figure 3.9	Create schematic and save	30
Figure 3.10	Flow chart how the alarm functions	32
Figure 4.1	Wireless Intelligence home security integrated with GSM model	34
Figure 4.2	Block diagram	35

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Figure 4.3	GSM Architecture	36
Figure 4.4	Tested picture microcontroller	39
Figure 4.5	Tested circuit microcontroller	40
Figure 4.6	Using DB9 to make connection	40
Figure 4.7	Simulation circuit	41
Figure 4.8	IR circuit	42

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LIST OF TABLE

TABLE	TITLE	PAGE
Table 2.1	RF transmitter module specifications	12
Table 2.2	RF receiver module specifications	14
Table 3.1	Gantt chart	31
Table 4.1	GSM parameter and specifications	38

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CHAPTER I

INTRODUCTION

1.1 Introduction

This project Wireless Intelligence Home Security Integrated with Global System for Mobile (GSM) was build to make sure that our residences is a safe place. This wireless burglars alarm was a wireless system which is the sensor and the control unit was connect without using wire. Besides that, this project was focus on microcontroller PIC16f877A.

Function of microcontroller is to control the input signal and then it will process the input to give a correct output at that time. Meanwhile, these wireless systems communicate using a radio frequency (RF) signal between sensor circuit and control unit. It also will send message to mobile phone using Global System for Mobile (GSM).

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1.2 Problem statement

As we can see today, most people still use man power on safety of their house. This project is an invention and a way to make human life become easier which is they can save their time and man power. These following are the problems are occurred and the reasons why people need this alarm.

Every house has an alarm, but when the intruders entered the house just a bell that rang. Owner never knows what happen to their house when they not home. To overcome this problem, Global System for Mobile (GSM) have been used, it will send short message to the phone saying that your house have been invaded.

It also use wireless tool that connect all the equipment. The intruders won't know where alarm been installed. It also can save a lot of wire to be use around the house to attach sensor and we also can cut the budget.

1.3 Objectives of Project

The objectives of this project are:

I. To design a wireless intelligence home security integrated with Global System for Mobile (GSM) that will inform owner about their house conditions.

II. To facilitate sensor to detect intruders by using wireless network control.

III. To research which sensor are suitable and accurate to combine with wireless component.

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1.4 Project Scope

For this project it focuses more for residence use. This Wireless Intelligence Home Security Integrated with Global System for Mobile (GSM) was focus on microcontroller PIC16f877A. Function of microcontroller is to control the input signal and then it will process the input to give a correct output at that time. Meanwhile, these wireless systems communicate using a radio frequency (RF) signal between sensor circuit and control unit. It also will send message to mobile phone using Global System for Mobile (GSM).

1.4.1 System design using Xbee

- We need transmitter and a receiver. The receiver must be connected to Peripheral Interface Controller (PIC) and for the transmitter circuit must be connected with sensor.

1.4.2 Controller Circuit using PIC

- Design and development of the system controller using Peripheral Interface Controller (PIC). Microcontroller that I used is PIC16f877A.

1.4. 3 Deployment

- Buy Global System for Mobile (GSM) and assembled it with Peripheral Interface Controller (PIC) circuit.

1.4.4 Sensor

- This project use infra red (IR) sensor that will be used which is use to detect any persons that enter the house through window because it will be placed there.

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1.5 Significant Of The Project

The significant of the Wireless Intelligence Home Security Integrated with Global System for Mobile (GSM) is:

i. By installing this device it can keep our residence safe.
ii. It also can alert owner when the strangers entered.
iii. Besides that, it also could decrease violence and potential threat to family members.
iv. Developments of the project that will reduce the symptoms of burglary in the resident without affecting the daily life of comfort and quality of consumer.

1.6 Project methodology

In this part, I have several main things to finish my project which are project planning, literature review and expected part of the project.

1.6.1 Determine the title.

- Determine project topic that going to be made.
- Surf internet to find the additional data.

1.6.2 Make research for the circuit will be involed.

- Read project book or circuit that project topic was being chosen.
- Make the analysis with all the circuit and equipment involed such as, wireless part, electronic circuit part and model part.

1.6.3 Get component for each sub system

- Make sure all components in the project circuit available in market.
- If not should find another component that have same function and can be combine with other device.

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1.6.4 Testing the component for each sub system

- Test every component whether in good condition or not.
- If not should have replace or get new one from the store.

1.6.5 Testing circuit for each sub system

- Purpose of testing circuit would be to ensure circuit can function nicely.
- If there is problem should troubleshoot the circuit and detect the problem.

1.6.6 Integrated circuit for each sub system

- Purpose of integrated circuit.

1.6.7 Evaluation of the system

- Test all the circuit of the system and test the all the functionality of the project.

1.6.8 Expected Result

- Testing of final assembly circuit in operation, application records the results.
- Presentation of the project.
- Finishing the technical report.

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CHAPTER II

LITERATURE REVIEW

2.1 Introduction

The idea for project wireless burglar alarm combine with Global System for Mobile (GSM) was build to make sure that our residences is a safe place. After seeing so many house get broke in it make me thinking about this alarm. Therefore, I have do some research on several books of the electronic circuit books, websites, eBooks and journals from the internet. After that, I start to plan the work on how to integrate the circuits in this project.

Before starting this project, I have done the literature on the project processing, this is to ensure that my project can be implementing and work properly. The control circuit that used in this project shall be accordance with the operational control of an electronic circuit. As a result, I have to do some research for the functional circuit that I am going to use in this project. I also have done some modification on several existing control circuit, this is to make sure that the functional of the circuit is suitable for the project. All of this circuit modification is changes based on the guidance from reference material.

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2.2 Microcontroller circuit

Control circuit is the most important part in this project, it is to make sure that the project can be function well as the planned. In this project, I have chosen some control circuit such as, Microcontroller. All of this control circuit are use to make sure that the circuit can operate and perform well in future.

2.3 Components and equipment

The most important components are electronic components that will appliance in an electronic circuit. Components or circuit findings are create and defined by performance characteristics of a component. Components are produced with its owned functions and operated in accordance with the resolution made. The components that will use in this project are the microcontroller, sk40c circuit, Global System for Mobile (GSM), and etc. There are also a variety of tools used such as soldering iron, suckers, and others.

2.3.1 SK40C Circuit

SK40C is another enhanced version of 40 pins PIC microcontroller start up kit. It is designed to offer an easy-to-start solution for PIC MCU user. Users are able to utilize the function of PIC by directly plugging in the I/O components in whatever way that is convenient to them. With UIC00B connector on board, user can start developing projects and have fun with this kit right away. This kit comes without PIC microcontroller to provide the freedom for user to choose PIC model [10].

The method of using SK40C with PIC16F887 by interfacing with others common use electronic components such as sensor, LED, UART, PS2 controller and etc. This will help me on deeply and easily understanding the function of SK40C, microcontroller and also the programming.SK40C board comes with basic element for user to begin project development. It offer plug and use features [10].

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Figure 2.1: Example of SK40C circuit.

2.3.2 Global System for Mobile (GSM)

GSM modem is specialized type of modem that operates over subscription based wireless networks which is similar to a mobile phone. A GSM modem accepts a SIM card, and basically acts like a mobile phone for the computer. Traditional modem is attached to computers for „dial-up" to connect with other computer systems. A GSM modem operates in a similar fashion, except that it sends and receives data through radio waves rather than a telephone line.

Besides the dial-up connection, GSM modem can also be used for sending and receiving SMS which is also one of the key features of GSM modem[4]. In this issue, we discuss on how to set up a simple home automation where we can control and monitor the alarm status by using SMS. Some of the features of this GSM Modem are as follow:

- RS-232 Interface
- Tri-Band: GSM900, GSM1800 and GSM1900
- Support TCP/IP
- Support standard extended open AT commands
- Support GPRS class 10
- Accept supply voltage from 5 to 12V
- Support PDU and Text mode for SMS

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In this project, I also use the SK40C together with PIC16F877A as the main controller. I also need to short the DSR and DTR, and also the CTS and RTS, those are pin required for hand-shaking. Without shorting these pairs of pin, the system might not work as expected. This main controller is connected to the GSM modem via a MAX232 circuit as shown in the schematic below.

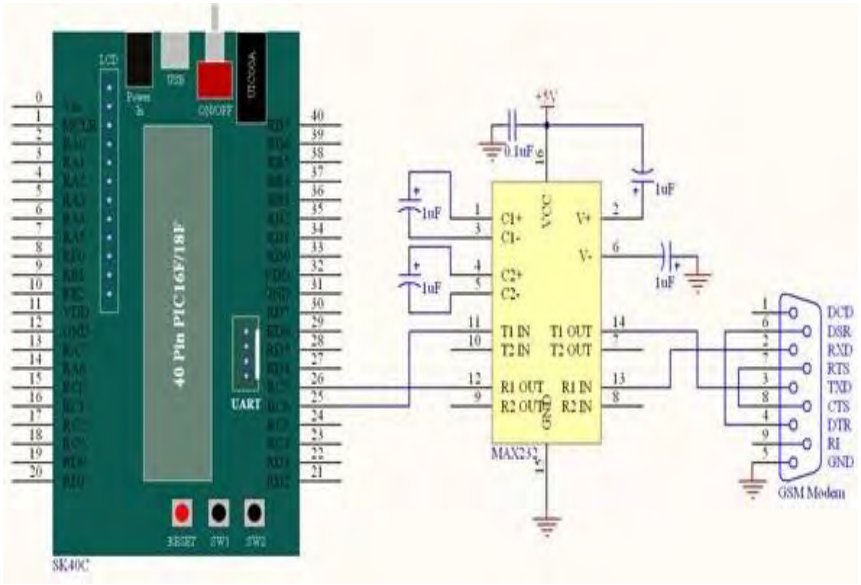

Figure 2.2: Schematic for interfacing the SK40C with a GSM modem

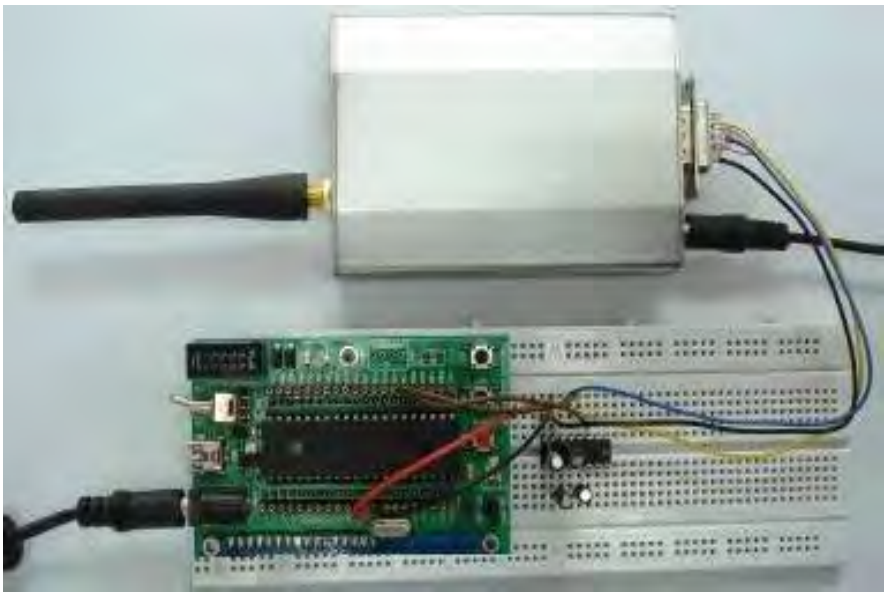

Figure 2.3: Components for GSM to enable the function

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2.3.3 Microprocessor PIC16F877A

A microcontroller is a stripped-down version of the very same architecture, with all the important features placed on one chip. The same system as the previous figure using a microcontroller looks like Figure 2. The microcontroller based system requires no additional circuitry except a clock input and it can, many cases, directly drive peripheral outputs. The difference between the microprocessor and the microcontroller arises because of their different end-usage. The microcontroller that will be investigated is the PIC16F877, which is at the upper end of the mid-range series of the microcontrollers developed by MicroChip Inc. It is characterized by RISC architecture instead of the CISC architecture used, for example, by the Motorola 6809.

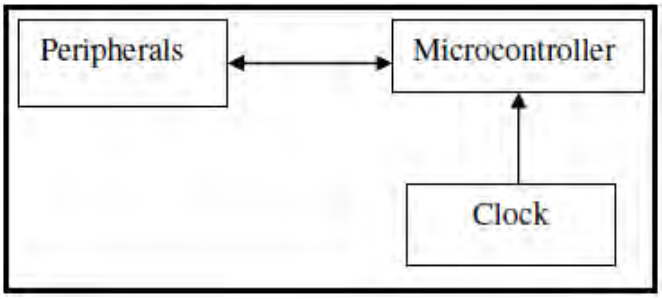

Figure 2.4: A microcontroller based system

A PIC 16F877A series is one of the chip microcontroller programmer, it function is simple to use and low cost. Nowadays, microcontrollers play an essential role in our daily lives. For an electronics hobbyist, microcontrollers will offer a wide range of possibilities that would be otherwise un-reachable. This microcontroller can program, read and verify code data, write lock bits, erase and blank check. The feature of PIC 16F877A have the same core architecture and compatible instructions sets. The most significant variation among PIC chips is the instruction size, which can be 12, 14, or 16 bits. This type of chip has a maximum clock speed of 20 MHz, and the main upgrade from the original 16F877 device [7].

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