SECURITY SYSTEM ALERT VIA SMS

NURMARIZAH BINTI UMAR

This Report Is Submitted In Partial Fulfillment Of Requirements For The Bachelor Degree of Electronic Engineering (Telecommunication Electronic)

Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer Universiti Teknikal Malaysia Melaka

April 2011

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : SECURITY SYSTEM VIA SMS

Sesi Pengajian :

1	0	/	1	1

Saya NURMARIZAH BINTI UMAR

(HURUF BESAR)

mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (√) :

☐	**SULIT***	*(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD****	**(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	**TIDAK TERHAD**	

Disahkan oleh:

_____ (TANDATANGAN PENULIS)

_____ (COP DAN TANDATANGAN PENYELIA)

Tarikh: ……..

Tarikh: ……..

"I declare that this report entitle "Security System Alert via SMS" is the result of my own research except as cited in the references."

Signature : ……

Name : NURMARIZAH BINTI UMAR

Date : 3 MAY 2011

"I hereby declare that I have read through this report entitle "Security System Alert via SMS" and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electronic engineering (Telecommunication Electronic)"

Signature : ……..

Supervisor's Name : MR MAZRAN BIN ESRO

Date : 3 MAY 2011

ACKNOWLEDGEMENT

Alhamdulillah,

With the strength and wisdom that has been given to me by Allah, I have managed to accomplish my final year project.

In preparing this report, I was in contact with several people. They have contributed towards my understanding and thought. In particular, I wish to express appreciation to my supervisor, Mr Mazran Bin Esro, for encouragement, guidance and improvement critics.

Mr Sani Irwan should also be recognized for his guidance. My sincere appreciation also extends to all colleagues and others who have provided assistance at various occasions. Their views and helps are useful indeed. I am grateful to my family member for being supported.

Thank you

ABSTRACT

The project proposed is about providing security system that will alert the user through SMS. Throughout the system, user will be alerted if intrusion occurred within compound area of attached sensor. This system used of sensor, microcontroller, GSM modem and hand phone as main components. Security system applied is fully wired as easy to troubleshoot and better performance in speed compare to wireless system. Implementation of GSM modem technology is function to improve the security system by sending alerting message to user as they are away from that compound area. The main objective of this proposed project is to enhance the security system so those equals to standard of living nowadays which enable user to be alerted in real time as intrusion occur. Besides, it is to provide security system that will easy to install and produce lower power consumption. The method used in this project was illustrated using flow chart. Simulation, prototype construction and calibration were implemented. Gantt chart helps in scheduling the flow of project activities so that will be accomplished in specific time required. At the end of the project, the security system was applied to a prototype home. When intrusion detected, an "Intrusion" message received at the user's hand phone.

ABSTRAK

Projek yang dicadangkan adalah untuk menyediakan sistem keselamatan yang akan memberitahu pengguna melalui SMS. Melalui sistem ini, pengguna akan diberitahu jika gangguan berlaku di kawasan-kawasan yang dipasang sensor. Sistem yang digunakan terdiri daripada sensor, mikrokontroler, modem GSM dan telefon bimbit sebagai komponen utama. Keselamatan sistem yang digunakan adalah menggunakan wayar kerana mudah untuk dikenalpasti masalah dan menunjukkan prestasi yang lebih baik dalam kelajuan berbanding dengan sistem tanpa wayar. Penerapan teknologi modem GSM adalah berfungsi untuk meningkatkan sistem keselamatan dengan menghantar mesej amaran kepada pengguna apabila mereka berada jauh dari kawasan yang dilengkapi sistem ini. Tujuan utama projek yang dicadangkan adalah untuk meningkatkan sistem keselamatan supaya sama dengan standard kehidupan saat ini yang membolehkan pengguna untuk diberitahu dalam waktu sebenar intrusi berlaku. Selain itu, ia bertujuan untuk menyediakan sistem keselamatan yang akan mudah untuk dipasang dan menghasilkan pengambilan kuasa yang rendah. Kaedah yang digunakan dalam projek ini digambarkan dengan menggunakan diagram alur. Simulasi, prototaip pembinaan dan kalibrasi turut diterapkan. Gantt chart membantu dalam penjadualan aliran kegiatan projek supaya akan diselesaikan dalam masa yang tertentu yang diperlukan. Pada akhir projek, sistem keselamatan ini diterapkan ke rumah prototaip. Apabila intrusi dikesan, sebuah "Intrusion" mesej diterima pada telefon tangan pengguna.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A/D	-	Analog to Digital
ASM	-	Assembly language
AT	-	Attention
CCD	-	Charge Coupled Device
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
EPROM	-	Erasable Programmable Read-Only Memory
HACS	-	Home Appliance Control System
HNG	-	Home Network Gateway
ICD	-	In Circuit Debugger
ICSP	-	In Circuit Serial Programming
I/O	-	Input/Output
I^2C	-	Inter-Integrated Circuit
GPRS	-	General Packet Radio Service
GSM	-	Global System of Mobile
LED	-	Light-emitting diode
OTP	-	One Time Programmable
PC	-	Personal Computer
PDA	-	Personal Digital Assistant
PDU	-	Protocol Data Unit
PIC	-	Programmable Interface Controller
PIR	-	Passive InfraRed
PSoC	-	Programmable System on Chip
PWM	-	Pulse Width Modulation
RAM	-	Random-Access Memory
RF	-	Radio Frequency
RISC	-	Reduced Instruction Set Computing

Rx	-	Receiver
SIM	-	Subscriber Identity Module
SMP	-	Switch Mode Pump
SMS	-	Short Message Service
SPI	-	Serial Peripheral Interface
Tx	-	Transmitter
USART	-	Universal Asynchronous Receiver Transmitter
USB	-	Universal Serial Bus
WAP	-	Wireless Application Protocol
WSN	-	Wireless Sensor Network

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

This chapter covered project's background, problem statement, objectives and scope of the project. Overview of methodology used was stated. The organization of this report also explained in this chapter.

1.1 Background

This project is about providing security system alert for a place (Eg: home) through the SMS for security system. This project is combining security system technology and GSM technology. The function of SMS is to inform user for any contraction or intrusion in the absence of owner in real time. The system covered one type of sensor as the basic of security system for home. The sensor is vibration sensor. The operation of this security system is illustrated in Figure 1.1.

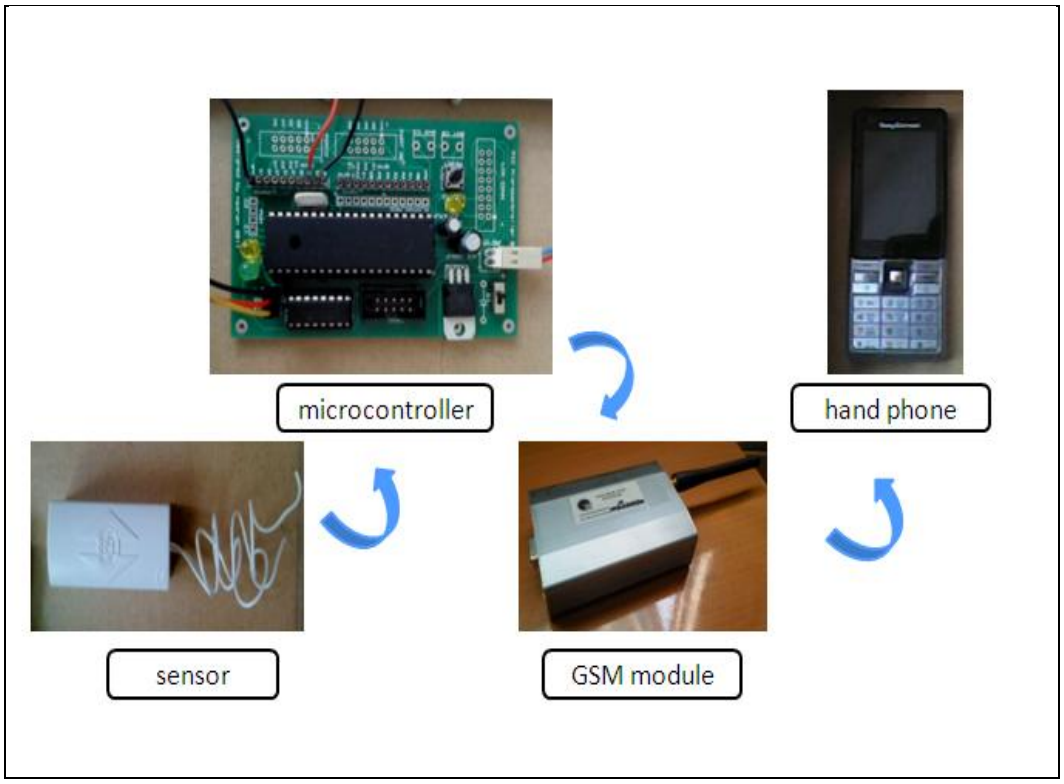

Figure 1.1: Security system

The GSM technology is used for SMS notification to user mobile phone. The short notification message will used in form of AT (attention) command.

Keywords: Sensor, Microcontroller, GSM modem, SMS, AT command

1.2 Problem Statement

Normally security system offered in market is fully wired system. In practical, it is not convenient for a home to apply this wired security system as more than one sensor will be used. In consideration, the wire system is more reliable than wireless system as it is easy to troubleshoot and better performance in speed. As current need in activating the system, higher power consumption cannot be avoid if system used is fully function using direct electric supply. In result the cost of system application is higher in cost. Application of security system for home do not mean anything if the user not alert when sensors triggered. Basic security system implementation only allowing the user alerted if they are still inside the house. As

they are away from home, the security system installed becomes less helpful as no person will be alerted. Alerting system via SMS is proposed in this project for user notification in real time as the intrusion occurs.

1.3 Objectives

This project proposed in order to overcome the problems stated before. The objectives of the project are:

1. To enhance the security system using technology so that equally following the standards of living nowadays. This system is focus on providing the safety and guarantee for home owner as they are away from home by using sensor and GSM technology.
2. To enable user to be alerted in real time as intrusion occur through SMS. This system enable user to be acknowledged about the intrusion even away from home.
3. To provide productive security system that will work with wire, easy installation and produce low power consumption.

1.4 Scope

1.4.1 Project Specification

This project requires the use of hardware and software that relate to security system. It carried out into two parts. The first part (Part A) covered the hardware and software for security system that consist the needs of sensor, main controller and LEDs. The other part (Part B) of the system focus on the application of SMS with the security system designed. This part will cover the uses of GSM modem in form of AT command to send and receive request command. The specifications in design are as follows:

- No sensors design. Sensor part will be carried out by use the available sensor in market.
- Application of PIC starter kit
- Assemble the PIC board with sensor and LEDs
- Use GSM modem through RS232 interface
- Integrate the whole system

1.4.2 Study the Required Components

The corresponding components need in this project was studied. The function and operation of the device involved was understood. This include to study the manual of MOD 9001D RS232 GSMGPRS Modem User, PIC 16F877A's datasheet and MAX232's datasheet. The other components used are resistor, capacitor, vibration sensor and LEDs.

1.4.3 Calibrate and Design

The components require calibration to ensure the functionality and accuracy. For any damage or flaw in corresponds part, replacement or adjustment need to be done. The following procedure is to design the circuit for first part (Part A) of security system alert using calibrated components. This followed design the circuit for second part (Part B) that involved device for SMS notification. The complete circuit is then assembled by combining Part A and Part B.

1.4.4 Developing Source Code for Microcontroller

The microcontroller is like the heart of the whole system. To ensure it is successfully function, the programming is needed. In this scope, the programming language was studied, written, compiled and finally burned into the PIC 16F877A. The source code was written using PIC C Compiler. The programming divided into

two parts. The source code for Part A was simulated using Proteus 7 Professional software to ensure it is function. For Part B, the microcontroller required to interface with GSM modem. Since the GSM modem worked in AT command language, the SIM300 AT Command Set User Manual was studied.

1.4.5 Testing and Troubleshoot

The functionality of hardware and software cannot be determined without integrate and test the whole system. For any malfunction in system, troubleshoot was done. This part assumed successfully if expected result obtained.

1.5 Overview of Methodology Used

In carried out this project, methods involve are literature review on journals, books and internet sources. Software and hardware construction divided into two parts. Flow chart used to illustrate the flow of project while Gantt chart used to scheduling project activities. Further explanation about methodology is continued in Chapter Three.

.

1.6 Report Outline

This report organized into six chapters. Chapter one gives an overview about the project that included explanation on background, problem statements, objectives, scope, summary on methodology used and report outline. The second chapter covered literature review of the project. Third chapter discussed the methodology used in this task. Result of the project included in chapter four while discussion for whole carried out project done in chapter five. Chapter six or the last chapter is for conclusion.

CHAPTER 2

LITERATURE REVIEW

This chapter summarized all of the related fields and knowledge for completion of this project. To get a picture of what the project about, literature review for associate journals was done. To design the complete circuit, a designer has to study and understand all of the required components by using their data sheets.

2.1 Journals

Literature review was done on several journals that relate to the project development. Each journal was reviewed and summaries based on this project relativity.

2.1.1 "A Remote Home Security System Based on Wireless Sensor Network and GSM Technology"

Huiping Huang, Shide Xiao, Xiangyin Meng and Ying Xiong (2010) had designed "A remote Home Security System Based on Wireless Sensor Network and GSM Technology". This paper presents one solution for establishing a low power consumption remote home security alarm system. The system, based on WSN and GSM technology, can detect the theft, leaking of raw gas and fire, and send alarm message remotely. The hardware of this system includes the single chipC5081F310, wireless receiving and sending chip CC1100 as well as the SIMENS TC35 GSM module. The system software developed in C51 language has the ability of collecting, wireless receiving and transmitting data, and can send a piece of alarm short message to the user's mobile phone when some dangerous condition has been detected. With the advantages of reliability, easy usage, complement wireless, and low power consumption, the system also has practical value in other fields [1].

Implement of wireless sensor network (WSN) and GSM technology inside this project due to three major advantages of it. First, an alarm message can received by user in time of intrusion occur. Second, it is ease establishment with no wire or cable applied and the third reason due to low power consumption.

This journal explained in detail about the design of home security system based on wireless sensor network and GSM technology. It consists of hardware development and software development that divided into two parts that are wireless sensor network node module and GSM network module. Hardware design used C8051F310 MCU as data processing unit, CC1100 wireless receiving and transmitting chip and SIMENS TC35 as GSM module. Software used supported C51 language for WSN node communication and GSM communication.

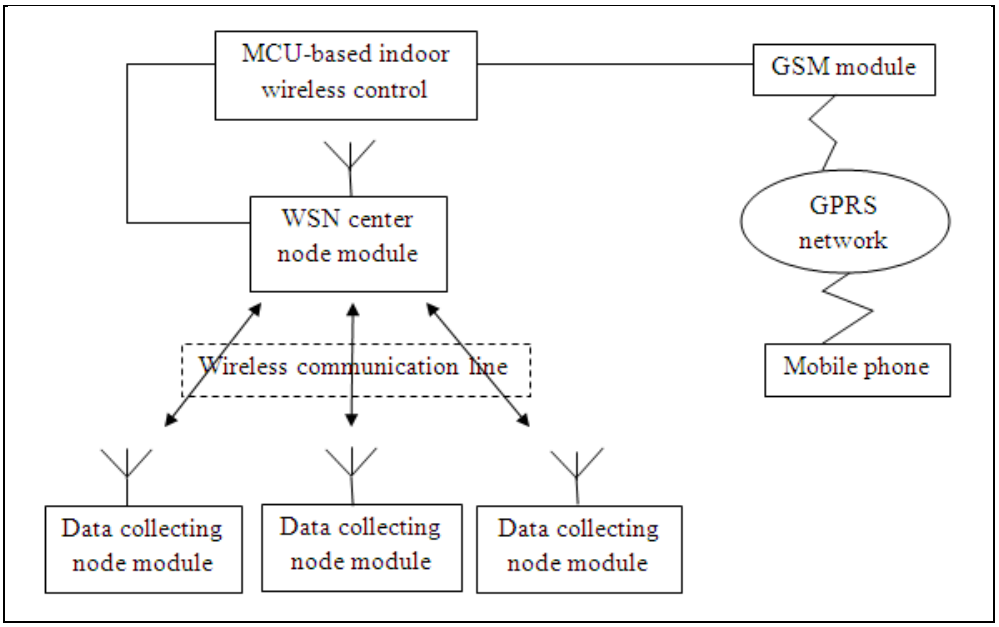

Figure 2.1: System structural diagram

The operation of this system start with sensors detect any intrusion occur and send encoded alarm signal to home control center through WSN. From there, it will triggered GSM module to send SMS alert notification to user's mobile phone through GSM network.

Designation and construction of hardware divided into two parts that are WSN node module hardware and GSM module hardware. For WSN node module, it consists of four parts: data collecting unit, data processing unit, wireless communication unit and power management unit.

Data collecting unit built up using sensors and A/D conversion module. Data processing unit is the main part or center unit of WSN which is applied C8051F310 MCU from Cygnal Corporation. Its function to save and process data received from sensors. The wireless communication unit used dual-way chip CC1100 to communicate with C8051F310 through SPI interface. Center node bit different as not connected with sensors instead with GSM module. TC35 GSM module chosen because its features support the requirement of design.