HOME APPLIANCES AND SECURITY CONTROLLED VIA GSM SYSTEM

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This Report Is Submitted In Partial Fulfilment of Requirements for the Bachelor Degree of Electronic Engineering (Wireless Communication)

Fakulti Kejuruteraan Elektronik dan Komputer

Universiti Teknikal Malaysia Melaka

June 2014

UNIVERSTI TEKNIKAL MALAYSIA MELAKA

FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN

PROJEK SARJANA MUDA II

Tajuk Projek : HOME APPLIANCES AND SECURITY CONTROLLED VIA GSM SYSTEM

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Special dedicated to

My beloved father and mother,

To my family and fellow friends,

Thank you for the support and encouragement

ACKNOWLEDGEMENT

Alhamdulillah grateful to Allah, I have done my thesis and submitted it on the time given. A lot of challenge I have to face in order to finish this thesis as well as the final year project. But, I feel grateful because I learn a lot and get new experiences that I think very valuable in my life.

I would like to wish a million thank you to my supervisor, Siti Rosmaniza Ab. Rashid because guide me very well, giving and sharing opinion and also willingness to help me in completing my final year project.

I also like to thank my family especially my beloved parents, Yusop Abdurahim and Norfajariah Abdullah for their support in every aspect especially in financial aspect in order for me to complete my project. May Allah S.W.T repay all their kindness and bless all of us. Amin.

ABSTRACT

Global System for Mobile Communication (GSM) has been proven to be an effective and efficient communication device over a long distance using the telecommunication satellite [1]. The main objective of Control Home Appliances and Security via GSM is to develop a system where user able to control household appliances by using cellular phone through GSM module and get alert with the intruder and to implement a microcontroller-based control module that receives instruction from cellular phone over GSM network. This project will able to control household appliances ON and OFF by sending messages through mobile and get messages alert if any intruder detected by PIR sensor. This will provide an easy way to turn ON and OFF the home appliances when the user is not at home or forget to switch OFF their electrical appliances. This project is mainly consist of two important parts which is hardware development and software development. The hardware is designed by using EAGLE Software version 6.2. It covers the connection between GSM module, PIR sensor, buzzer and relay circuit. This project also consist with the microcontroller to control interface. Meanwhile, the software is designed by using Proton Compiler software. The system built has function properly when it activated by using 12V power supply. The GSM system able to receive and transmit data from and to cellular phone. The circuit also able to trigger the buzzer and control relay to turn ON and OFF home appliances

ABSTRAK

Sistem Komunikasi Global telah terbukti menjadi salah satu alat komunikasi yang efektif untuk komunikasi jarak jauh dengan menggunakan satelit perhubungan. Objektif utama projek ini adalah untuk membina satu system dimana pengguna boleh menguasai peralatan elektrik di rumah dengan menggunakan telefon bimbit. dan juga boleh berwaspada sekiranya terdapat penceoboh yang dapat dikesan. Selain itu, objektif nya adalah untuk melaksanakan satu modul kawalan berasaskan mikropengawal yang menerima arahandari telefon selular dan sistem kominikasi global.

Projek ini membolehkan pengguna untuk membuka dan menutup peralatan di rumah dengan hanya menghantar mesej melalui telefon bimbit dan mendapat mejej berjaga-jaga jika pencoreboh di kesan. Projek ini memudahkan pengguna untuk mengawal perlatalan elektrik di rumah jika pengguna tidak berada di rumah mahupun pengguna terlupa untuk menutup suis perlatan elektik rumah. Sistem ini telah direka dengan menggunakan "*EAGLE Software 6.2"*. Ia meliputi sambunagn antara GSM sistem, penderi PIR, penggera dan alat pengganti. Projek ini juga mempunyai "*micro-controller*" yang mengawal sepenuhnya keseluruhan projek ini. Semetara itu, perisian sistem ini pula direka dengan menggunakan Perisis Proton compiler. Sitem ini akan aktif apabila disambngkan dengan bekalan kuasa 12V. sistem ini boelh berfungsi dengan baik dan jaya nya kerana GSM boleh menerima dn menghantar data dari dn kepada telefon bimbit. Litar ini juga mampu untuk mengawal perlatan elektrik rumah dengan baik.

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LIST OF ABRREVIATION

GSM	Global System for Mobile Communications
SMS	Short Message Service
PIR	Passive/pyro electric Infra-Red
LED	Lighting Emitting Diode
PC	Personal Computer
PIC	Peripheral interface Controller
EAGLE	Easily Applicable Graphical Layout Editor
I/O	Inpu/Output
IC	Integrated Circuit
MCU	Microcontroller Unit
AT	Attention
VCC	Voltage at common collector
SMSC	Short Message Service Center
CDMA	Code Division Multiple Access
TDMA	Time Division Multiple Access
N/C	Normally close
N/O	Normally Open
EMF	Electromagnetic frequency
RISC	Reduced Instruction Set Computing

CHAPTER I

INTRODUCTION

In this chapter, each of project background, objective, problem statement, and scope of project and advantages of Global System for Mobile Communications is explained in detail.

1.1 Introduction to Project

Global System for Mobile Communications (GSM) based Control System implements the emerging applications of the Global System for Mobile Communications (GSM) technology. Using Global System for Mobile Communications networks, a control system has been proposed that will act as an embedded system which can monitor and control appliances and other devices locally using built-in input and output peripherals [1].

Remotely the system allows the user to control the house appliances and equipment via the mobile phone set by sending commands in the form of Short Message Service (SMS) and receiving the appliances status. The main concept behind the project is

receiving the sent SMS and processing it further as required to perform several operations [1]. The type of the operation to be performed depends on the nature of the Short Message Service (SMS) sent. There are several terminologies that are used extensively throughout this project report.

GSM (Global System for Mobile Communications): It is a cellular communication standard.

SMS (Short Message Service): It is a service available on most digital mobile phones that permit the sending of short messages (also known as text messaging service).

1.2 Background

The new age of technology has redefined communication [2]. People nowadays have access to mobile phones and thus the world indeed has become a global village. At any given moment, any particular individual can be contacted with the mobile phone. But the application of mobile phone cannot just be restrict to sending SMS or starting conversations. New innovations and ideas can be generated from it that can further enhance its capabilities. Technologies such as Infra-red and Bluetooth which has developed in recent years goes to show the very fact that improvements are in fact possible and these improvements have eased humans' life.

These days, apart from supporting voice calls a mobile phone can be used to send text messages as well as multimedia messages (that may contain pictures, graphics and animations). Sending written text messages is very popular among mobile phone users. Instant messaging, as it is also known, allows quick transmission of short messages that allow an individual to share ideas, opinions and other relevant information.

In this project, concept of system is to receive messages in term of commands to control different appliances and devices that had connected with the Global System for Mobile Communications technology. With this, the user will be able to control the home appliances by sending command to switch on or switch off the home appliances.

Besides, in order to monitor the safety of the house, PIR sensor also implemented in the circuit. When any motion is detected, circuit will trigger the buzzer and alert the user by sending a text “Intruder alert”.

1.3 Objectives

The main objective of this project is:

- Develop a system where user able to control household appliances by using cellular phone through Global System for Mobile Communications module and get alert with the intruder.
- Implement a microcontroller-based control module that receives instruction from cellular phone over Global System for Mobile Communications network.

1.4 Problem Statement

This project is develop in order to solve below problems:

- Worried about home safety if there is nobody at home.
- It's a waste if lights or fan were leave ON if there is no one in the house.

1.5 Scope of Project

Scope of this project are:

- Proton compiler : Deals with coding
- GSM modem : Receive data from the user
- PIR sensor : Detect the motion
- Eagle 6.2 software : To create the schematic diagram of the circuit

1.6 Outline of Thesis

This thesis consists of five chapters. Chapter 1 in this thesis about some introduction of project background, objectives, problem statement and scope of the project. Chapter 2 is about review based on previous research that have done by researcher about system for remote monitoring and control. Besides, it also will discuss about system design, including for hardware and software that use in this project. Chapter 3 discusses about circuit, project methodology flowchart and flowchart for software. Chapter 4 will show the overall results of this project, PIC programming results, hardware results and also discussion. Chapter 5 will discuss the conclusion and some suggestion for future works. The following are the main chapters and its descriptions:

Chapter 1: Do research about the background and scope of the project.

Chapter 2: Literature review about past project that related with Global System for Mobile Communications home security.

Chapter 3: Description about circuit, project methodology flowchart and flowchart for software.

Chapter 4: Software and hardware implementation and results.

Chapter 5: Conclusion and future recommendation for the project.

The project is dividing into several chapter to ensure the project to work in systematic so that the project will be able to implement smoothly.

Chapter 1: Do research about the background and scope of the project.

The first chapter is about project introduction, the main objective of this project is to develop a system where user able to control household appliances by using cellular phone through GSM module and get alert with the intruder by using PIR sensor.

Chapter 2: Literature review about past project that related with Global System for Mobile Communications home security.

This chapter explained on the previous past project that related with Global System for Mobile Communications control system. Advantages and disadvantages of the project is stated so that this project can improve the disadvantages of the previous project. This chapter also review in detail about the parts in the circuit,

Chapter 3: Description about circuit diagram, software development, project methodology and flowchart for software.

This chapter is explained in detail about the project methodology that used in the project as well as the design of circuit diagram, software development and also flowchart circuit operation.

Chapter 4: Software and hardware implementation and results.

In this chapter, it focuses more on hardware development, programming on microcontroller for Global System for Mobile Communications modem to send SMS. This chapter will review the results of hardware and how AT command is constructed.

Chapter 5: Conclusion and future recommendation for the project.

The last chapter will review overall of the project, whether the implemented solution is meet the objective of the project. Discussion on problems encountered, conclusion and recommendation for this project also done in this chapter.

CHAPTER II

LITERATURE REVIEW

2.0 Type of remote monitoring and control system.

There are many systems for remote monitoring and control design as commercial products or experimental research platforms [2]. It is noticed that most of the research carried out belongs to the following categories:

- Internet based Monitoring using Servers, GPRS modems, etc. with different approaches.
- Monitoring using Wireless Sensor Networks, Bluetooth, WiFi, Zigbee technologies
- GSM-SMS protocols using GSM module individually or in combination with Internet Technologies

2.1 Previous Project Analysis

2.1.1 Internet based monitoring

Internet monitoring is one of the common approaches for remote monitoring. Many researchers have worked in field of Internet based remote monitoring. Table 2.0 is a summary researches that have done about internet based monitoring [4].

Table 2.0: Research about internet based monitoring [4]

Researcher	Project description	Advantage	Disadvantage
Alkar and Buhur, 2005 [3]	Implemented Internet based wireless flexible solution where home appliances are connected to slave node. The slave nodes communicate with master node through RF and master node has serial RS232 link with PC server. The nodes are based on PIC 16F877 μc.	Efficient	Costly and complicated
Yuksekkaya et al., 2006 [4]	Developed wireless home automation system by merging communication technologies of GSM, Internet and speech recognition. GSM and Internet methods were used for remote access of devices of house whereas speech recognition was designed for users inside the house.	Easy to use because use speech recognition	Expensive to build

2.1.2 GSM-SMS Based Monitoring

With the wide spread use of cellular networks, this approach is also popular when small amount of data is to be transferred through the network. Table 2.1 is a summary researches about GSM-SMS based monitoring.

Table 2.1: Research about GSM-SMS Based Monitoring

Researcher	Project description	Advantage	Disadvantage
Alheraish, 2004 [5]	Implemented home security system by means of GSM cellular communication network using microcontroller 89X52 and Sony Ericsson GM-47 GSM module. This system enables far end user through SMS facility to monitor the state of home door, provide password facility for key based door lock and control home lighting system.	Provide security as well as control home appliances	Limited to soni Ericson phone user only
Van Der Werff et al., 2005 [6]	Proposed a mobile-based home automation system that consists of a mobile phone with Java capabilities, a cellular modem, and a home server. The home appliances are controlled by the home server, which operates according to the user commands received from the mobile phone via the cellular modem.	Easy to build	Limited to Sony Ericsson GT48 user