SMART HOME SYSTEM BY SENDING SMS VIA GSM MODEM

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This report is submitted in partial fulfillment of the requirements for the award of Bachelor of Electronic Engineering (Computer Electronics) With Honours

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APRIL 2011

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : Smart Home System By Sending SMS via GSM Modem

Sesi Pengajian : 2010/2011

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To my beloved father and mother

ACKNOWLEDGEMENT

First of all, I would like to thank ALLAH SWT because for HIS blessing, finally I able to complete my final year project with this thesis as well within the allocated time.

I would like also to thank my supervisor, Mr. Ridza Azri Bin Ramlee for all his teachings and guidance, his criticism on me and my work, and his experience help on this work. It has been a hardship for you, sorry and thank you so much.

My appreciation also to my beloved family especially my mother for all your love, sacrifice, understanding and support, without which, I could never ever walk the first step.

Lastly, my thanks to other colleagues and the persons who directly or indirectly involved and distributed in completing this project and not forget to all my friends who give their full commitment and their best effort. Thank you very much.

ABSTRACT

This project aims to develop and to design a smart home system by sending short message service (SMS) via global system for mobile communication (GSM modem) to invent the security system for home owners. The concept of smart home is an emerging issue to the modern technology dependent society. Remote control technologies are widely used to control household electronic appliances without walking up to them. Controlling household appliances through computer can also be a possible solution. However, it cannot fulfill the current demand which is to control them from remote places. The advantages of cellular communications like GSM technology is a potential solution for such remote controlling activities. GSM and SMS technology can be used to control household appliances from remote places. GSM modem was used for receiving SMS from user‟s mobile phone that automatically enable the controller to take any further action such as to switch ON and OFF the home appliances such as light, air-conditioner, and fan. The system was integrated with microcontroller and GSM network interface using assembly language. MPLab software was utilized to accomplish the integration. The system is activated when user sends the SMS to controller at home. Upon receiving the SMS command, the microcontroller unit then automatically controls the electrical home appliances by switching ON or OFF the device according to the user order. In other word, it read message from the mobile phone and response to control the devices according to the received message. The prototype has been successfully developed and it could provide an effective mechanism in utilizing the security home.

ABSTRAK

Projek ini bertujuan untuk membangunkan dan merancang suatu sistem rumah pintar dengan menghantar perkhidmatan mesej ringkas (SMS) melalui sistem global komunikasi mobil (GSM modem) untuk mencipta sistem keselamatan bagi pemilik rumah. Konsep rumah pintar merupakan isu yang timbul dalam masyarakat teknologi moden bergantung kepada kawalan teknologi yang banyak digunakan untuk mengendalikan peralatan elektrik di rumah tanpa berjalan kepada mereka. Mengawal peralatan di rumah melalui komputer juga boleh menjadi penyelesaian yang mungkin. Namun, ianya tidak dapat memenuhi permintaan ketika pemilik rumah berada di tempat-tempat terpencil. Kelebihan dari komunikasi bimbit seperti teknologi GSM adalah penyelesaian berpotensi untuk kegiatan seperti kawalan jarak jauh. GSM dan teknologi SMS boleh digunakan untuk mengawal peralatan-peralatan rumah dari tempat-tempat terpencil. Modul GSM digunakan untuk menerima mesej ringkas (SMS) dari telefon bimbit pengguna dan secara automatic membolehkan tindakan lanjut diambil seperti „*ON'* atau „*OFF'* peralatan di rumah seperti lampu, penghawa dingin dan kipas. Sistem ini berintegrasi dengan „*microcontroller'* dan rangkaian GSM dengan menggunakan „*assembly language'*. Perisian MPLab digunakan untk mencapai integrasi. Sistem ini beroperasi apabila pengguna menghantar SMS, dan unit „*microcontroller'* akan secara automatik mengawal peralatan elektrik rumah dengan „*ON'* atau „*OFF'* peranti sesuai dengan pesanan pengguna. Dengan kata lain, sistem ini mengikut arahan yang dihantar oleh pengguna menggunakan telefon bimbit dan „*microcontroller'* beroperasi seperti arahan yang di berikan. Prototaip ini telah berjaya dibagunkan dan boleh memberikan suatu mekanisme yang berkesan dalam memanfaatkan keselamatan rumah.

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ASCII	-	American Standard Code for Information Interchange
AT	-	Attention
BSC	-	Base Station Controller
BTS	-	Base Transistor Station
CDMA	-	Code Division Multiple Access
CMOS	-	Complementary metal–oxide–semiconductor
EEPROM	-	Electrically Erasable Programmable Read Only Memory
EPROM	-	Erasable Programmable Read Only Memory
ETSI	-	European Telecommunications Standards Institute.
GPP	-	Generation Partnership Project
GPRS	-	General Packet Radio Service
GSM EDGE	-	Enhanced Data Dates for GSM Evolution
GSM	-	Global System for Mobile Communication
IC	-	Integrated Circuit
ITU-T	-	Telecommunication Standardization Sector
JAL	-	Just Another Language
MS	-	Mobile Station
MSC	-	Mobile Switching Center
PC	-	Personal Computer
PDU	-	Protocol Data Unit
PIC	-	Peripheral Interface Controller
POTS	-	Plain Old Telephone Service
PROM	-	Programmable Read Only Memory

RAM	-	Random Access Memory
ROM	-	Read Only Memory
SIM	-	Subscriber Identity Module
SMS	-	Short Message Service
TDMA	-	Time Division Multiple Access
TTL	-	Transistor–transistor Logic
USART	-	Universal Serial Asynchronous Receiver Transmitter
WAP	-	Wireless Application Protocol

CHAPTER I

INTRODUCTION

1.1 Project Introduction

Smart Home System is a project used to control any devices in home or in office or in other places can switch on or off. The goal of a smart home system on enabling those who live in them to control a large number of electronic devices easily and remotely. A simple smart home system might, for instance, turn on the kitchen lights and turn off the alarm when the garage door opener activates. Smart homes typically have many more complicated systems, but they all operate via the same principles.

Smart homes work via fairly simple systems: PIC and SMS. Normal home devices such as lights, entertainment systems, heaters, air conditioners, computers, security systems and radios are equipped with receivers. This PIC detects a certain signal initiated by the code SMS, which can be housed in a control device such a light switch or, most commonly, a remote control.

In order to design the smart home system in this project, this system can control by using Short Message Service (SMS). Nowadays, Short Message Service (SMS) is widely used as a form of data communication. It is about 2.4 billion active users which

equals to 74% of mobile phone subscribers sending and receiving text messages on their phones. SMS is a communication application in Global System for Mobile communication (GSM) system. It allows interchange of short text messages between mobile telephone devices using standardized communication protocols.

The system in this project is design to receive the SMS from any mobile device to the GSM modem that connected to microcontroller. In order to prevent any occurrence of SMS likelihood control words, the sending SMS that contain control words should come between the specified codes that protocol between user of far mobile phone and the GSM modem that connected to the microcontroller. After the GSM modem which connected to the microcontroller receives the sent message, it sends this message to the microcontroller.

1.2 Problem Statement

The situation prevailing today always calls for people and property to be completely secure. In early days security was not of this concern. Advancement in every field and all walks of life has rendered the world with more of malpractice committed by a sect of people who are socially not unacceptable. Nowadays in organizations, other than conventional means of security electronic security systems are a common feature. The devices provide a foolproof system from which everyone can feel highly secured.

The development of digital information has led the rapid change in human lifestyle. The use of electricity is very important as one of the main source of energy that is vital in today modern life. Thus a prototype based on a microcontroller device using

SMS and GSM modem is developed. It can automatically control any electrical equipment at home remotely using mobile phone. Hence the people security guaranteed and also electrical energy saving in daily life can be made more efficient and effective.

1.3 Objective of Project

The main objective of this project is to design and develop a security system for house owner that is capable of monitoring any intruders and other emergency situation by alarming the house owners via short message service (SMS).

1.4 Scope of Project

There are a few scopes and guidelines listed to unsure the project is conducted within its intended boundary. This is to ensure the project is heading in the right direction to achieve its intended objectives.

i. To design the smart home circuit by using Protel DXP.
ii. MPLab IDE v8.63 is used to program the PIC by using assembly language.
iii. To develop the program that can integrate and control the overall system.

1.5 Methodology

Stage 1: Do literature review for the project system by study the characteristic of the components that will be used and understand the operation of the circuit.

Stage 2: The next process is to plan how the project or problem formulated be organized and possible solution are arranged systematically.

Stage 3: The project is then divided into two parts; hardware design and software design. The Protel DXP software has been chosen in the circuit design, while the MPLab IDE is to program the PIC using assembly language.

Stage 4: The final circuit design then finally be printed on the PCB board and unit test is performed to ensure its error free then final testing to indicate the integration is free from error. Troubleshooting activity executes if error is encountered.

1.6 Thesis Outlines

This thesis consists of five chapters. The following chapters are the outline of the implementation of smart home system.

Chapter I Will discusses briefly the overview of this project such as introduction, objectives, problem statement, and scope of work, methodology and thesis outlines.

Chapter II This chapter contains the research and information about the project on several important concepts of smart home system, technology and tools used in the study. This chapter also includes details in software and hardware design for smart home system. Background of GSM modem and several types of smart home that consist in our industry also are discussed in this chapter.

Chapter III This chapter will discuss more about methodology used in order to solve the project problem. All those methodology should be followed to get a better performance.

Chapter IV This chapter will discuss result and analysis detailed on designing smart home system of the gantry crane model. Hardware and Software results will be discussed in this chapter. All construction circuit, analysis, observations and designs are represented in this chapter. The results presented in this thesis are based on the design procedure that has been stated before.

Chapter V This chapter will discuss about the discussion, problem, conclusion and suggestion of this project. Any comment or suggestion can be attached in order to improve the project in the future.

CHAPTER II

LITERATURE REVIEW

This chapter contains the research and information about the project on several important concepts of smart home system, technology and tools used in the study. This chapter also includes details in software and hardware design for smart home system. Background of GSM modem and several types of related work that consist in our industry also are discussed in this chapter.

2.1 Introduction

This section provides a previous study of related work regarding the application of SMS services in a various fields. Some previous researches have been studied to gain more information about current existing GSM control system that was previously implemented. It is necessary to know and understand how the software and hardware were used in the SMS controlled system development. This is to ensure that the study that currently being conducted contribute at certain level of application thus it become more efficient and practical.

2.2 Related work

2.2.1 Home Security with Messaging System, Security & Control System and Remote and Security Control via SMS

Several smart home projects such as Home Security with Messaging System [2], Security & Control System, and Remote and Security Control via SMS [5] were the three alarm system that were designed using SMS application to securely monitor the home condition when the owner are away or at night. A system as suggested by [2] triggered by SMS to the home owner to notify the owner of any incident happened around the house such as robbery or fire. The security system uses mobile phone with a combination of microcontroller circuit PIC16F877A which interfaced with the computer. The system work accordingly when the sensor actively triggered by any abnormal activity, then the PIC circuit also automatically activate the computer to send SMS to the owner using mobile phone modem.

2.2.2 Automatic Power Meter Reading System using GSM Network,

Meanwhile, the system Automatic Power Meter Reading System using GSM Network [3] is automating the power reading meter to send the energy consumed to e-billing system at authorized office. The system works by integrating the GSM modem that was embedded with digital kWh power meter. It utilizes the GSM network to send power usage reading using SMS to the authorized office. The authorized office collect and manage the received SMS message contains the meter reading to generate the billing cost and send back the cost to the respective consumer through SMS.