DEVELOPMENT OF HOME SECURITY ALERT SYSTEM USING GSM MODULES

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Industrial Power) (Hons.)

by

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2015
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: DEVELOPMENT OF HOME SECURITY ALERT SYSTEM USING GSM MODULES

SESU PENGAJIAN: 2014/15 SEMESTER 2

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DECLARATION

I hereby, declared this report entitled Development of Home Security Alert System Using GSM Modules is the results of my own research except as cited in references.

Signature : ______________________
Name : Fatin Nabilah Binti Abd Halim
Date : ______________________
This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Power) (Hons.). The member of the supervisory is as follow:

……………………………….
(Project Supervisor)

……………………………….
(Project Co-Supervisor)
ABSTRACT

Conventional safety system is the most important system used to protect one's life and property. Nowadays, a lot of cases related with the safety of house. As advised prepared salvation conventional systems have a certain limit. In an age of high technology, users are looking forward to a product or system that ensures the safety of their belonging. In addition, to facilitate them in doing daily activity. This project developed to solve residents’ problems about the safety of their premises or houses. The main objective of this project is to design and develop the system that will alarming the user when have any intrusion, fire and gas leakage by SMS via GSM module. Besides that, it is also to deliver a warning SMS to the users instantly when intrusion or fire and gas leakage occurs. Thus, research project is formed to accomplish the will of the user. Development of Home Security Alert System Using GSM Modules project is a security system that encompass two important parts namely development of software and development of hardware. Something can be proven insistence project through development of hardware. For this project, the magnetic switch, temperature sensor and gas sensor are used. Magnetic switch is used for the detection of intruders or any movement that indicates an intrusion is going on. Magnetic switch will be installed at the gate and casement home where intruders normally break in through. Fire sensor is installed around the house to get a pre-alert during fire that may be caused by short circuit or overload current. Meanwhile, for gas sensor it mounted at the kitchen for early detection of gas leakages. Software Development for this project consists of microcontroller in C language embedded, Proteus to simulate the circuit that is related and GSM modem. Overall, this project work is all sensor which is magnetic switch, gas sensor and fire sensor will react and deliver microcontroller to send the SMS to user via GSM immediately. Analysis and discussion forms they have been run and in the end, positive results have been achieved.
ABSTRAK

DEDICATIONS

Special thanks to my family especially Mak and Ayah

Special thanks to my supervisor, Puan Intan Mastura

Special thanks to colleagues, especially Nik Nazirul Amin
ACKNOWLEDGMENTS

First of all, I would like to thanks ALLAH S.W.T for HIS blessings to me. A very thanks to my parents, Mr Abd Halim Bin Md Nor and Mrs Ruslinda Binti Wan Chik for their support and inspiration for me to complete this Bachelor Degree Project 1 (BDP1). Finally, I am able to complete my BDP1 with this thesis within allocated time.

I would extend to thank my supervisor, Mrs Intan Mastura Binti Saadon for all the information and guidance that she had given to me. She had given her best to guide me to finish this thesis with all her knowledge, experience and skills. It had been a very hard and difficult time for you to guide me. I am sorry for my mistakes to you and thank you very much.

I would to extend my appreciation to all my colleagues, especially Nik Nazirul Amin who was involved and helped in completing this thesis. A special thanks to all my housemates who gave support and help. Thank you very much.
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<tbody>
<tr>
<td>ARFCN</td>
<td>Absolute Radio-Frequency Channel Number</td>
</tr>
<tr>
<td>ASCII</td>
<td>American Standard Code for Information Interchange</td>
</tr>
<tr>
<td>AUC</td>
<td>Authentication Centre</td>
</tr>
<tr>
<td>BBS</td>
<td>Base Station System</td>
</tr>
<tr>
<td>BSC</td>
<td>Base Station Controllers</td>
</tr>
<tr>
<td>BTS</td>
<td>Base Transceiver Station</td>
</tr>
<tr>
<td>EEPROM</td>
<td>Electrically Erasable Programmable Read Only Memory</td>
</tr>
<tr>
<td>EIR</td>
<td>Equipment Identity Register</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile Communication</td>
</tr>
<tr>
<td>HLR</td>
<td>Home Location Register</td>
</tr>
<tr>
<td>IMSI</td>
<td>International Mobile Subscriber Identity</td>
</tr>
<tr>
<td>ISIS</td>
<td>Intelligent Schematic Input System</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>MS</td>
<td>Mobile Station</td>
</tr>
<tr>
<td>MSC</td>
<td>Mobile Switching Centre</td>
</tr>
<tr>
<td>PIC</td>
<td>Programmable Interface Controller</td>
</tr>
<tr>
<td>PIR</td>
<td>Passive Infrared</td>
</tr>
<tr>
<td>SIM</td>
<td>Subscriber Identity Module</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Messaging Service</td>
</tr>
<tr>
<td>SS</td>
<td>Switching System</td>
</tr>
<tr>
<td>UART</td>
<td>Universal Asynchronous Receiver/ Transmitter</td>
</tr>
<tr>
<td>VLR</td>
<td>Visitor Location Register</td>
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CHAPTER 1
INTRODUCTION

1.0 Background

Home – security, fire, gas using GSM modules are a security alert system that triggers, user when there is an occurrence of trespassing, fire or gas leakage in the house. This project aims to design a home system by sending short message service (SMS) via GSM modem to invent the security system for homeowners. GSM controller is integrated in order to operate security doors and windows access, fire and gas leakage in this project. Besides that, hardware and software development are two vital development in this project. The software development consists of the development of the PIC controller code and GSM message command. The hardware development includes the PIC interfacing circuit, magnetic sensor, smoke sensor, gas sensor and buzzer. One of the important features of this project is that it can ensure the security and safety of their houses vicinity regardless of time. Whenever the intrusion or fire and gas leakage occur in the house, the controller will automatically trigger the alarm and send an SMS alert to the user. The reason why this project uses GSM module as a main part is to alert the user with the best way. As we know, the buzzer has a limited distance range. The users cannot hear the alarm or buzzer if they are not within the range but with the GSM module, the user will get the SMS as an alert.

1.1 Problem Statement

The reason why this project needs to be developed is to solve residents’ problems about the safety of their premises or houses. Statistics of crime, especially robbery in Malaysia increases year by year. In December 2nd at Pasir Puteh, two thieves broke into a house. This incident has caused Tema, the owner and her two daughters,
Shafiqa and Shafatini a traumatic experience. Tema suffered injuries below her right eye and cuts on her left cheek, while Shafiqa suffered cuts on her face. This case happened due to the victims do not install home security system in their home. So far, there is no safety system using a GMS module like in overseas. They have safety systems that secure the safety of owner if there is any bad incidents which includes intruders, fire and gas. Nowadays, Malaysian people have lack of time to take serious caution of their houses and properties security matter due to their busy working schedule. Any houses or properties that do not have any kind of home security system seem like giving opportunity to burglary, fire and gas leakage. A home security system that is installed in houses or properties can keep away from any burglary attempt and secure the house from fire and gas leakage.

1.2 Objective

The aim of the project is:

a) To design and develop the system that will alarming the user when have any intrusion, fire and gas leakage by SMS via GSM module.

b) To deliver a warning SMS to the users instantly when intrusion or fire and gas leakage occurs.

1.3 Project Scope

This project is divided into three major activities which is studying about GSM module, develop hardware and software. Whenever the system detects any intruders’ attempt, it will send an SMS alert to the homeowners via GSM Modules. When the magnetic switch detects any intruders, the PIC will send a signal to GSM to send SMS to the user. PIC controller and GSM message command are two programs that are involved in software development. While, the interface between the PIC and the
circuit, magnetic switch, smoke sensor and gas sensor and buzzer are consisted in hardware development.

1.4 Project Significance

This project will be a significant endeavour in promoting good system of home security that makes life greater and better. This project will likewise be beneficial to the proprietor of a home where the proprietor will be aware whether their houses are in safe condition or not from intruders, gas leakage or fire.

1.5 Thesis Outlines

There are three chapter in this thesis include of introduction of the project, literature review which is the works of others that related with this project and lastly the method that used to implement the knowledge into project.

Chapter I: This part briefly discusses on the general idea of this project including of introduction, problem statement, the target of this project, the scope of project, project significant and thesis outlines.

Chapter II: This part focuses more to study the literature review which is previous work that related with this project. It is important in order to obtain the some knowledge or concept of Home security. Then, the explanation in general of software development, hardware development and also the information about the main component GSM and PIC interfacing are also deliberated.

Chapter III: The brief clarification of methodology are discussed in this part. It consists of flowchart of whole project and the description of component that will be used to solve the problem statement.
1.6 Expected Result

This project will achieve the objective of the project, which 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 GSM module. Besides, this project can reduce crime statistic in Malaysia, especially house robbery and also can avoid gas leakage and fire accident.
CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This chapter will include all related information and study in order to achieve the project aims. It involves the research and information around the project on various important concepts of security home system, engineering science and instruments utilized in the field. A study regarding all required components must be done in order to design the overall circuit. One of the method to gather information is by studying previous researches that has been done and related to this project. It is important to understand on how software and hardware were used in GSM Module system.

2.1 Related Work

There are sample journals that are relevant with Home – Security Alert System for Intruders, Fire and Gas using GSM Modules. These journals use the component similar with Home- Security System. These journal are used as a reference to complete this project.

2.1.1 Smart Home Security by Sending SMS via GSM Modem

Alia Hassan (2011) had designed “Smart Home Security by Sending SMS via GSM Modem”. This paper presented a smart home security by sending short message services (SMS) through GSM module to visualize the security plan for householders. The idea of shrewd home is a developing issue of the cutting edge innovation subordinate society. Controlling family unit machines through the PC can likewise be a conceivable arrangement. Be that as it may, it cannot satisfy the current interest,
which is to manipulate them from distant spots. The preferences of cell interchanges like GSM innovation are a possible solution for such remote controlling exercises. GSM modem was utilized for getting SMS from users’ mobile phone that naturally empower the controller to make any further move, for example, to switch ON and OFF the home machines, for example, light, ventilation system, and fan. The system was coordinated with microcontroller and GSM system interface utilizes low level computing construct. The system is initiated when user sends the SMS to controller at home. After accepting the SMS charge, the microcontroller unit then consequently controls the electrical home machines by exchanging ON or OFF the gadget as indicated by the client’s request. By other means, whenever the message is read from the mobile phones, the devices will send the data that the message has been received and read by the user. The model has been effectively created and it could give a successful component in using the security home.

2.1.2 GSM Based Security System

Aman Singh, Abhishek Yadav, H. P. Singh, S. K. Dubey (2014), had designed “GSM Based Security System”. The purpose of this project is to develop a home security system by utilising GSM and microcontroller interface. The aims of this project is to provide a good security system by using sensors, cameras, trapping system that has been installed at home.

2.1.3 Design and Implementation of Modular Home Security System with (SMS)

Santoso Budijono, Jeffri Andrianto, Muhammad Axis Novradin Noor (2014), had designed “Design and Implementation of Modular Home Security System with Short Messaging System (SMS)”. The aim of this project is to develop a security system using GSM. It can deliver and alert SMS to the user. Besides that, it also enable the user to activate or deactivate system via SMS. Among the component that is used in this project is Passive Infrared (PIR) sensor and microcontroller AT Mega 328. PIR sensor is utilized as the main sensor for motion, camera for capture the image, sending
and delivering SMS using GSM modules and buzzer as an alarm device. This system are able to monitor home area that are included PIR sensing the field and it will send the SMS, capture the area image and scare the intruders when the buzzer is on.

2.2 GSM Modem

Omorogiwa Eseosa and Elechi Promise (2014) describe GSM modem is a specialized type of modem which accepts SIM card, and operates over a subscription to mobile. The features of the GSM Modem are used for transmitting and receiving SMS messages and allow data connection. This device are compactable with almost all mobile phones that contain GSM modules. To transmit and receive SMS messages, GSM modem needs to utilize an “extended AT command set” that can carry out the operations of mobile phones. Besides, it is implanted with other organizations due to the GSM modem is able to interface with others.

2.2.1 Basic Specification in GSM

The Table 2 shows the basic specification in GSM.

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<th>Specification</th>
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<td>Frequency of Reverse Channel</td>
<td>890-915 MHz</td>
</tr>
<tr>
<td>2</td>
<td>Frequency of Forward Channel</td>
<td>935-960 MHz</td>
</tr>
<tr>
<td>3</td>
<td>Frequency Spacing of Tx/Rx</td>
<td>45 MHz</td>
</tr>
<tr>
<td>4</td>
<td>Time Slot Spacing of Tx/Rx</td>
<td>3 Time Slots</td>
</tr>
<tr>
<td>5</td>
<td>Modulation Data Rate</td>
<td>270.8333333kbps</td>
</tr>
<tr>
<td>6</td>
<td>Frame Period</td>
<td>4.615ms</td>
</tr>
<tr>
<td>7</td>
<td>Users per Frame</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>Time Slot Period</td>
<td>576.9microsec</td>
</tr>
<tr>
<td>9</td>
<td>Bit Period</td>
<td>3.692 microsecond</td>
</tr>
<tr>
<td>10</td>
<td>Modulation</td>
<td>0.3 GMSK</td>
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