DESIGNING USER DEVICE AND SENSOR CIRCUIT FOR INTEGRATED HOME SECURITY SYSTEM (IHSS)
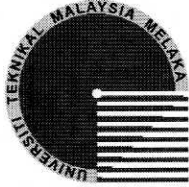
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This report is submitted in partial fulfillment of requirements for the award of Bachelor of Electronic Engineering (Industrial Electronics) With Honours

Fakulti Kejuruteraan Elektronik & Kejuruteraan Komputer

Universiti Teknikal Malaysia Melaka

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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : DESIGNING USER DEVICE AND SENSOR CIRCUIT FOR INTEGRATED HOME SECURITY SYSTEM(IHSS)

Sesi Pengajian : 2006/2007

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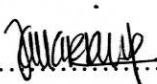Tarikh: 03 Mei 2007

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"Dare to face any challenge that will come and trust with your ability"

By Mohd Najmi Bin Aziz

For my dear mother, father, sister Nor Najua, brother Mohd Nazri, Farzerim Rohaida.

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ABSTRACT

Integrated Home Security System (IHSS) is a system that is built to acknowledge the authorized party by using a telephone call if the house is entered without permission. This project will concentrate on Designing User Device and Sensor Circuit for IHSS which is called as Part I of the IHSS. This part has three important circuits that are the remote controller circuit, the receiver circuit, and the sensor circuit. There are two possible conditions for the sensor circuit which are idle condition and active condition. If there is a disruption from the door, the sensor circuit will be activated and a signal will be transmitted to the Auto Dialer. The Auto Dialer will be discussed in Part II. The magnetic sensor will be used in this project as the device that will detect the action from the door. This magnetic sensor is very cheap and suitable for this project. The function of the remote controller is to control the system and to set the condition of the system. In this project, two LEDs were used to indicate condition of the system. The red one was used to indicate idle condition while the green one to indicate active condition.

ABSTRAK

Sistem Keselamatan Rumah Bersepadu (IHSS) adalah sebuah sistem yang dibina untuk memaklumkan pihak berkuasa melalui panggilan telefon secara automatik jika sesebuah rumah itu dimasuki tanpa kebenaran. Projek ini memfokuskan pada Merekabentuk Alat Pengguna dan Litar Penderia untuk IHSS pada Bahagian I. Bahagian ini mempunyai tiga litar penting iaitu litar alat kawalan jauh, litar penerima isyarat, dan litar penderia. Terdapat dua keadaan yang mungkin pada litar penderia iaitu samada ianya berada dalam keadaan aktif atau pun tidak aktif. Jika terdapat gangguan atau pergerakan dari pintu, litar penderia akan aktif dan isyarat akan di hantar kepada pendail automatik. Pendail automatik akan dibincangkan dalam Bahagian II. Manakala penderia bermagnet pula digunakan dalam projek ini sebagai satu alat yang boleh mengesan sebarang pergerakan dari pintu. Penderia bermagnet ini sangat murah dan sesuai untuk digunakan dalam projek ini. Alat kawalan jauh pula berfungsi untuk mengawal sistem dan menetapkan keadaan litar penderia. Sistem ini juga menggunakan dua LED untuk memaklumkan keadaan sistem. LED merah digunakan untuk memaklumkan bahawa sistem berada dalam keadaan aktif manakala LED hijau pula untuk memaklumkan bahawa sistem dalam keadaan tidak aktif.

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LIST OF ABBREVIATION

ISHH - Integrated Home Security System

RF   - Radio Frequency

PCB - Printed Circuit Board

TE   - Transmission Enable

LED - Light Emitting Diode

IR   - Infrared

LIST OF APPENDIX

CHAPTER I

PROJECT INTRODUCTION

This chapter will explain the introduction and the overall operation of this system. It also covers the objective that has been achieved and the problem that was occurring in the existing system.

1.1 Introduction

Security system is one of the very important parts at home. Over the last decade, the implementation of this idea has been attempted but it is not very effective because the reflection from the system was not directly to the authorities and police station. The signal from the system will sent to the company that produce the system and after that, this company will sent the signal and warning to the police station. However, it's taken a long time to get reaction and it can give chance for the robber to run away.

Therefore, the solution for this problem is to design the home security system that can give reaction in short time. This project function if somebody opened the door without using the key. There have one magnetic sensor to detect the action from the door and send the signal to the transmitter. And then, the transmitter will send the signal to the receiver that is called control panel. The receiver will function to receive the signal

and pass it to the controller for makes their action which to control and make decision which number that the dialer must call. By the way, when the owners want to enter the house, they can switch off the system by using the remote control. Actually, there have 2 light that can action to tell the owner weather the system is in the open circuit or short circuit. When the system in the open circuit, the green light will blaze but if the system is in the close circuit, the red light will blaze.

However, this project was divided to two parts. But in here, I will focus on the part I that consist of the remote control circuit, receiver circuit and the transmitter circuit. Entire of the component is very important to control all of the system weather there is activated or not.

1.2 Objective

This project had been build for everyone in the world that is thinking the safety is very important. To success in this project, there are few objectives that have to achieve such as:

i. To build the remote controller to activate and deactivate the sensor circuit.

ii. To build the receiver circuit that can receive the signal from the remote controller.

iii. To design and build the sensor circuit for signal detection and transmission.

1.3   Scope of Work

The designed user device and sensor circuit have some limitations according to the specification of the system. There are certain scopes that must been done and the scopes are:

i.   Switch ON/OFF the devices one at a time.

ii.   Only switch ON/OFF the devices, the system will activate and deactivate base on their   programmed.

iii.   The remote control that is used in this system can function only in 20 meter from the receiver.

iv.   The sensor circuit that is located behind the door should not very far from the other receiver that is near the telephone. The distance from the transmitter to the receiver is about 20 meter.

1.4   Problem Statement

Home security system is one type of security system that's very important and it's a priority for anybody. However, there have a lot of problems having in the current security system. The existing home security system that was build before this, is very expensive and have their own monthly fees that was charged by the company that produce the system.

Besides that, it also took long time to send the information to the obligation side because the company that produced the system was act as middle. The signal that has been send from the system will go through to this company first before it sent to the obligation side.

Another problem that also occurs in the existing home security system is it used the cable to connect all the system. Using cable is not suitable because the robber or

thief can sabotage the system by cut the cable. It also uses a lot of space and will using a lot of cable if the distance between the transmitter and the receiver is very far.

1.5   Methodology

In this system, there are a few important parts that consist all of the part in the part 1. Entire of the component except the remote control was installed behind the door and the function for all of component such as:

i.   Remote control circuit is function to control the system to make sure whether the circuit is in the open circuit or close circuit and transmit the signal to the receiver.

ii.   Receiver circuit is function to receive the signal that transmits from the remote control.

iii. Sensor circuit is functions for signal detection and transmission and transmits the signal to the other receiver in the part 2.

iv.   Sensor is function to detect action from the door and to activate the sensor circuit.

1.6   Report Structure

The content of this report is all about the project that had been done. This report will be divided into five chapters to provide reader to understand the whole project.

Chapter I is covering the overview of the project and the introduction of the project.

Chapter II will cover up entire of the project theory, perspective, method that was use to solve the problem and any hyporeport that related with the research of the methodology.

Chapter III is covers the research of methodology that was important in this project.

Chapter IV is covers the contrivance and the result of the data analysis or the project result that was found out from the project.

Chapter V will be about the whole contents of this report and project. By the end of this chapter, there are some discussion and conclusion for this project.

CHAPTER II

HOME SECURITY SYSTEM

This chapter will focus on the basic concept and theories needed for the development and implementation of the project. Many researches have been done for the present home security system. There still have a weakness in their system and the solution is in the Integrated Home Security System (IHSS).

2.1 Introduction of Home Security System

Home security system was use many type of sensor. The sensor that is used base on the application that want applied to the system. However, in this project it only uses the magnetic sensor because it is very cheap. In the home security system, mostly the companies that produce the system always use the CCTV to get the detail picture in any situation.

2.2 Breaking Circuit

The most basic burglar alarm is a simple electric circuit built into an entry way. In any circuit, whether it's powering a flashlight or a computer, electricity only flows when give it a path between two points of opposite charge. To turn the electricity on or off, it must open or close part of the circuit.

To open or close a flashlight circuit, that simply throws a switch. In a burglar alarm, the switch detects the act of intrusion such as opening a door or window, for example. These sorts of alarms are divided into two categories:

i. In a closed-circuit system, the electric circuit is closed when the door is shut. This means that as long as the door is closed, electricity can flow from one end of the circuit to the other. But if somebody opens the door, the circuit is opened, and electricity can't flow. This triggers an alarm.

ii. In an open-circuit system, opening the door closes the circuit, so electricity begins to flow. In this system, the alarm is triggered when the circuit is completed.

There is a number of ways to build this sort of circuit into an entry way. Closed circuits are normally a better choice than open circuits because an intruder can deactivate the open circuit by simply cutting the connected wires.

A magnetic sensor in a closed circuit consists of a few simple components. For the most basic design, it's need:

i. a battery powering a circuit
ii. a spring-driven metal switch built into a door frame
iii. a magnet embedded in the door, lined up with the switch
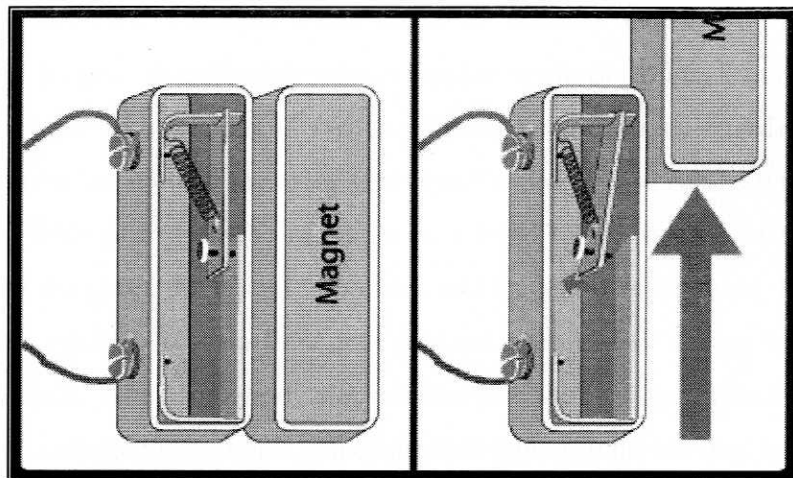iv. A separately-powered buzzer with a relay-driven switch.

Figure 2.1: How the magnetic sensor operate

When the door is closed, the magnet pulls the metal switch closed so the circuit is complete. The current powers the relay's electromagnet, so the circuit stays open. Based on the Figure 2.1, it shows that when the magnet moves by opening the door, the spring snaps the switch back into the open position. This cuts off the current and closes the relay, sounding the alarm. It can also build this sort of system into a window. If an intruder pushes a window open, the magnet slide out of line with the switch, and the buzzer is activated. Another simple burglar alarm uses a small button as the switch. The button is embedded in the door frame, so closing the door pushes it in. When somebody opens the door, the button is released, changing the circuit and sounding the alarm. With just a battery and buzzer, these designs make for fairly flawed security systems. After all, the burglar only needs to close the door again to turn the buzzer off. That's why most modern burglar alarms incorporate another piece into the circuit such as the control box.

The control box is hooked up to one or more alarm circuits, but it also has its own power supply. It monitors the circuits and sounds the alarm when they are closed or opened depending on the design. But once the alarm is triggered, the control box won't cut it off until somebody enters a security code at a connected keypad. For added security, the control box is usually positioned in an out-of-the-way spot, so the intruder can't find it and attempt to destroy it.