

FENCE INTRUDER DETECTION SYSTEM (FIDS)

CHUINK BENG CHEONG

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

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2009



UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN
KOMPUTER

**BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II**

Tajuk Projek : Fence Intruder Detection System (FIDS)

Sesi Pengajian : 2 / 2008/2009

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Special thanks to my family, project supervisor and friends

ACKNOWLEDGEMENT

First and foremost, I'm very grateful to all those who contributed time, concern and efforts to teach in order to provide and to pass on knowledge. At the same time, I would like to special thanks to my supervisor; En. Imran Bin Ibrahim, because of his comments, critiques, and suggestion were taken seriously to make me understand the world of engineering. Their supports have led me to practice and learn more and more from them in order to be an engineer in the future.

I also wish to thank the countless individuals who have shared their suggestion and evaluations in my works all the time. However, the experience that I have gained would not have been possible without the guidance of all engineers, assistant engineers, technicians and operators.

And finally, I also appreciate the flagging support of my friends who had providing lots of constructive criticism and the way of an engineer should be. It would not have been possible to complete a report of this magnitude without the support from them.

ABSTRACT

Nowadays, many house break-in cases involved the usage of weapon occur especially in the urban area. One of the main reason that lead to the cases is lack of precaution. An effective security system can assure the safety of the resident. Security system can be categorized into few categories, one of them is Fence Intruder Detection System (FIDS). This system emphasize on the safety of the outside of the house perimeter. A tight security sytem at least can reduce the percentage of the intrusion to occur. This system functioned by placed the sensors on the fence that able to sense any vibration. As a notification to the house owner, the system will activate an alarm to inform the user that an intrusion had occured. Webcam added in the system to monitor the situation on the outside of the house area. A Graphical User Interface (GUI) also created as control panel to the system. The webcam will record the situation of the fence area once intrusion detected.

ABSTRAK

Pada masa terdekat, banyak kes pecah rumah bersenjata berlaku terutamanya terutamanya di kawasan bandar. Salah satu faktor utama berlakunya kejadian ini kerana kurangnya langkah keselamatan dari mangsa sendiri. Langkah keselamatan yang berkesan diyakini dapat mengurangkan kes pecah rumah. Sistem keselamatan tergolong dalam pelbagai jenis, salah satu daripadanya ialah Sistem Keselamatan Pegasan Kawasan Berpagar. Sistem ini menekankan aspek keselamatan pada kawasan luar rumah. Sistem kawalan keselamatan yang ketat pada kawasan pagar rumah sekurang-kurangnya dapat memberikan amaran sebelum penceroboh berjaya memecah masuk ke dalam rumah. Sistem ini berfungsi dengan meletakkan alat pengesan pada bahagian pagar yang dapat mengesan sebarang getaran. Alat pengesan ini akan mengaktifkan alat penggera sebagai tanda amaran kepada tuan rumah. Kamera diaplikasikan dalam sistem ini untuk merakamkan situasi semasa kejadian berlaku. Satu sistem kawalan dengan menggunakan komputer juga dihasilkan dengan Visual Basic 2008. Sebarang kegiatan yg dikesan oleh alat pengesan akan dirakamkan melalui kamera pada sistem kawalan.

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LIST OF ABBREVIATIONS

FIDS	-	Fence Intruder Detection System
SFR	-	Special Function Register
PIC	-	Peripheral Interface Controller
RAM	-	Random Access Memory
ROM	-	Read Only Memory
GUI	-	Graphic User Interface
ADC	-	Analog Digital Converter
DAC	-	Digital Analog Converter
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
CCP	-	Capture/Compare/PWM
PWM	-	Pulse Width Module
DTE	-	Data Terminal Equipment
DCE	-	Data Circuit-terminating Equipment
LED	-	Light Emitter Diode
UTeM	-	Universiti Teknikal Malaysia Melaka
RF	-	Radio Frequency
VT	-	Valid Transmission
TE	-	Transmission Enabled

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CHAPTER I

INTRODUCTION

1.1 BACKGROUND STUDY

As the burglary cases increase seriously nowadays, it will become a big threat to our society in terms of safety especially. Burglary is a crime the essence of which is entry into a building for the purposes of committing an offence. Usually that offence will be thieves, but most jurisdictions specify others which fall within the ambit of burglary. The thieves were intentionally to steal the properties of the victims and may commit physical offence too. Serious actions and alternatives had been taken by the government to reduce the numbers of burglary cases.[1] However, these crime cases keep increasing especially in the urban area though various actions had been taken. Improve the security system is one of the action that can effectively overcome these problems. Fence Intruder Detection System also known as FIDS is one of the security system that able to prevent the thieves from break into the house. FIDS operate by focus on the outside of the house area, specified sensors or detector placed onto the fence. The FIDS functioned as a security system in the housing area by sending alert signal as the thieves or burglaries are detected. To increase the efficiency of the system, camera will be added on the system to record video once the intruder is detected. The video captured will be stored in computer's memory through certain program. The captured data then useful as evidence for the police or investigator to track the person involved.

1.2 OBJECTIVE

The main objective of this project is to design a Fence Intruder Detection System (FIDS) that capable to track the existence of burglars efficiently. Most of the system available in market was expensive in term of cost and easily hacked by the intruder. Hence, this project is mainly developed to reduce the number of burglary cases in the housing area. The fence intruder detection system designed also must be low cost and high efficiency.

Another objective of this project is to reveal the capability of the PIC16F877A microcontroller. Microcontroller is an integrated chip that combined all the system in microcomputer. Generally, PIC used to store the instructions the operating system. In this project, PIC microcontroller used to convert the analog input received from the sensors into digital signal before transmits the data to control panel.

Besides, designer also will be exposed to the various functions of Visual Basic. Visual Basic used to create a Graphical User Interface (GUI) that act as control panel to the FIDS system. The system able to capture and store data by using suitable program that linked to Visual Basic. Hence, Visual Basic functioned to monitor the operating system through the central unit processing.

Before construct the hardware part, designer must test the designed circuit whether function properly or otherwise. Proteus Schematic Simulation and CCS Compiler is the suitable program to build and test the system. Proteus used to build the circuit while CCS Compiler is compiler for the microcontroller. Simulation is important so that any modification or improvement can be done to the designed system. Besides, the cost of construction also can be minimize by reduce the number failure in circuitry construction.

1.3 PROBLEM STATEMENT

A false alarm can be defined as an alarm condition that resulted from something other than a break-in, fire or an actual emergency situation. When a sensor operates, it is hardly false, and it is usually a true indication of the present state of the sensor. A more appropriate term is nuisance, indicating that the alarm activation is inconvenient, annoying, or vexatious. A sensor unable to differentiate between the motion of human and animal. Hence, the alarm system frequently creates the nuisance alarm that becomes a problem to residents. Over time, repeated false alarms in a certain area may cause occupants to start to ignore all alarms, knowing that each time it will likely be a fake.

1.4 SCOPE OF WORK

This project is subjected to several scope and limitations that are narrowed down to the study. One of the main subjects is to develop an interface between hardware and software of the microcontroller. Besides, this project also subjected to construct the model of security system that focus on the house perimeter.

1.5 METHODOLOGY

First and foremost, designer needs to construct the circuit by using Proteus simulation and compile with source code by using CCS compiler. After the circuit finish designed, construct the circuit to the real board. The development of the board required etching process by eliminating the unwanted line of the circuit. PIC 16F877A microcontroller is used to store the instruction by using assembly language (asm file). Then connect the FIDS system to computer through RS232 serial port that functions as the control panel. Design a Graphical User Interface (GUI) by using Visual Basic. The GUI used to monitor the operation of the system. MAX 232 integrated circuit is used to interface the computer and the circuit developed. Additional camera will be put on the house replica to surveillance the house area.

1.6 REPORT STRUCTURE

Chapter one briefly introduces the overall of the project titled Fence Intruder Detection System (FIDS). The introduction consists of overview, objective, problem statement, scope of work, methodology and structure report.

Meanwhile, chapter two discuss about the background of study related to FIDS system. Literature review will produce overall structure of the FIDS system which shows the relation between project research and theoretical concept.

Chapter three will explain about the project methodology. Project methodology give details about the method used to solve problem to complete the project. The methods used such as collecting data method, process and analysis data method, modeling and etc.

Chapter four consists of result and discussion to all an initial result, finding and analyses during the research.

Finally, this PSM report ended with the project conclusion. This chapter concludes the project findings, analysis of project achieved and suggestion for the future research.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is a literature review on theoretical concepts applied in this project. This chapter includes with the brief explanation on the operation of Fence Intruder Detection System (FIDS), what are microcontroller, RS232 and sensor.

2.2 PERIPHERAL INTERFACE CONTROLLER (PIC)

PIC is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1640 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Programmable Interface Controller".



Figure 2.1 Peripheral Interface Controllers (PIC)

PICs are popular due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

The PIC architecture can be generally characterized by the following features:

- a) separate code and data spaces (Harvard architecture)
- b) a small number of fixed length instructions
- c) most instructions are single cycle execution (4 clock cycles), with single delay cycles upon branches and skips
- d) a single accumulator (W), the use of which (as source operand) is implied (ie is not encoded in the opcode)
- e) All RAM locations function as registers as both source and/or destination of math and other functions.
- f) a hardware stack for storing return addresses
- g) a fairly small amount of addressable data space (typically 256 bytes), extended through banking
- h) data space mapped CPU, port, and peripheral registers
- i) the program counter is also mapped into the data space and writable (this is used to implement indirect jumps)

Unlike most other CPUs, there is no distinction between "memory" and "register" space because the RAM serves the job of both memory and registers, and the RAM is usually just referred to as the register file or simply as the registers.

2.2.1 MICROCONTROLLER- PIC 16F877A

Generally, there are many types of PIC had been produced based on specification for each of them. Besides, the construction of the latest PICs also improved by referring to the previous construction. For this project, designer had chosen the PIC 16F877A based on the suitability to this project. Below is the data sheet of the PIC 16F877A that consist of 40 pins.[2] [3]

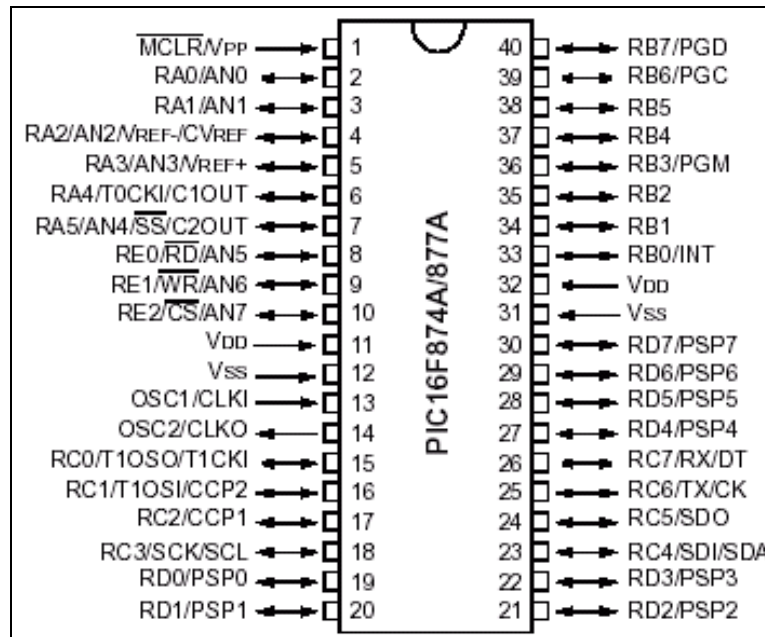


Figure 2.2 Figure of PIC16F877A

Table 2.1 list down the device features for the PIC 16F877A. The special features of these devices efficiently help the designer to construct the circuit. For example, designer no need to use integrated circuit of Analog-Digital Converter nor Digital-Analog Converter to convert the signal through the PIC since that the ADC/DAC already integrated in the PIC. [4]

Table 2.1 Key Features of PIC 16F877A

Key Features	PIC16F877A
Operating Frequency	DC - 20 MHz
RESET (and Delays)	POR, BOR (PWRT, OST)
FLASH Program Memory (14-bit words)	8K
Data Memory (bytes)	368
EEPROM Data Memory	256
Interrupts	14
I/O Ports	Ports A,B,C,D,E
Timers	3
Capture/Compare/PWM Modules	2
Serial Communications	MSSP, USART
Parallel Communications	PSP
10-bit Digital-to-Analog Module	8 input channels
Instruction Set	35 instructions