PASSWORD DOOR SECURITY SYSTEM WITH LCD DISPLAY

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This report is submitted in partial fulfillment of the requirements for the award of
Bachelor of Electronic Engineering and 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	:	Password Door Security System with LCD Display
Sesi Pengajian	:	2008/2009

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To my beloved mom and dad

ACKNOWLEDGEMENT

First and foremost, I would like to extend my appreciation to all those who contributed time, concern and efforts to lend a helping allowing me to gain invaluable knowledge. On top of that, I would like to reserve a special thank to my supervisor; Cik Nurmala Irdawaty Bt Hassan for all her comments, constructive criticism, and suggestion were taken seriously to make me understand the world of engineering. Their supports have leaded 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 been made possible without the guidance of my engineer friends and seniors.

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

This project is to develop a password door security system using microcontroller and can be further enhance for more advance functions. The main objectives are to familiarize with the concepts and functions of PIC16F877A and also to design a security PIC-based programming code. This system uses keypad as user's input interface and LCD display as output regarding to user's input. The LCD display will shows the password symbols and desired words like short notices or messages. In order to change or remove the messages, the program coding can be modified and reload it to PIC. When the password input wrongly for three times, the system will shut down to fulfill the security purpose. For advance functions, this system will integrated with a speaker which human sound can be generated followed by the words shown in display. The users will feel convenience when using this product since its functions is easy and flexible.

ABSTRAK

Projek ini bertujuan untuk menghasilkan satu sistem gabungan antara pintu sekuriti dengan kata laluan dengan menggunakan mikro pengawalan dan projek ini boleh diperkayakan lagi dengan fungsi-fungsi lain yang lebih canggih. Objektif utama bagi projek ini adalah untuk mengenali konsep dan funsi-fungsi bagi mikro pengawalan PIC16F877A dan juga menghasilkan kod-kod program yang melibatkan sistem sekuriti. Sistem ini menggunakan 'keypad' sebagai input kepada pengguna dan skrin lcd berperanan sebagai output berdasarkan input pengguna. Skrin lcd akan menunjukkan kata laluan dalam simbol '*' dan pesanan ringkas seperti notis atau mesej pendek. Jika pengguna ingin menukar mesej atau kata laluan, pengguna hanya perlu memodifikasi kod-kod program yang sedia ada dan seterusnya muat turun ke dalam PIC. Untuk perkembangan produk ini pada masa depan, sistem ini akan tutup serta-merta jika pengguna gagal memasukkan kata laluan yang betul sebanyak tiga kali untuk memenuhi syarat asas sistem sekuriti. Seterusnya, projek ini akan disambungkan dengan pembesar suara di mana suara nyata manusia akan dimainkan diikuti dengan perkataan yang dipaparkan pada skrin lcd. Pengguna akan berasa selesa apabila menggunakan produk ini disebabkan aplikasinya agak senang dan fleksibel.

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LIST OF ABBREVIATIONS

PIC	-	Peripheral Interface Controller
RAM	-	Random Access Memory
ROM	-	Read Only Memory
ADC	-	Analog Digital Converter
DAC	-	Digital Analog Converter
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
CCP	-	Capture/Compare/PWM
PWM	-	Pulse Width Module
LED	-	Light Emitter Diode
LCD	-	Liquid Crystal Display
UTeM	-	Universiti Teknikal Malaysia Melaka

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CHAPTER I

INTRODUCTION

This project focuses on the basic of developing a simple password door security system using microcontroller and can be further developed for more advance applications. For instance, real human sounds may be generated followed by the words showed on LCD display. Besides, the display also shows the location when someone is not around. The main purpose of doing this project is to enhance the security system of lecturer's room and also to inform lecturer's location to other people when they are not in the room.

1.1 Project Objectives

These are the main purposes of this project

- To familiarize with the concept and operation of PIC16f877a programming software.
- To develop programming code of the security PIC-based system.
- To familiarize with the skills and techniques in combining software and hardware for a system.

1.2 Problem Statement

Nowadays, human always rely on electronic devices to make their lives more convenience. The purpose of this project is to replace door key into a reliable door security system. This will be the best solution for those who always forget to bring their house or office room key before left.

1.3 Scope of Work

This project will focus primarily on circuit construction such as PIC16F877A as the microcontroller, LED as power indicator, 4x4 keypad for keying in password, ICSP (In Circuit Serial Programming) for loading program, and push button as input for PIC microcontroller. Second, this project will also focus on LCD screen display which is used to display words and password symbols. Finally, relay and buzzer will function as output for this system which can be applied to any daily application such as door lock.

Other aspects such as the production and marketing of the password door security system with LCD display will not be covered in this project.

1.4 Methodology

Proteus ISIS 6 Professional is used to design the circuit and simulate it. After completing the circuit assembly and configuration, its time to verify whether the source code compiled is virtually accurate or not. The source code is designed by using PICC Lite Compiler with MPLAB IDE which is widely used by most of the programmers where their project is related to PIC-based system or microcontroller. When the simulation successfully runs, this means that the circuit can be constructed and soldered on PCB board. Then, the circuit will be tested and troubleshooting may necessary taken to overcome those circuitry problems. After all done without error, the circuit will be packaged and the users may ready to use.

1.5 Thesis Outline

This thesis is a document that delivers the ideas generated and the concept applied. It consists of 6 chapters which are Introduction, Literature Review and Methodology.

Chapter 1 delivers a brief introduction about the project, its objectives, problem statement, scope of work and simple methodology.

Chapter 2 contains the literature review of the project. It discusses the researches done upon the related project and data obtained through journals, books, magazines, and internet.

Chapter 3 describes the methodology of the project which includes the project flow and its functional block diagram. It also discusses the methods used for the project such as software applied and the reasons behind it.

Chapter 4 included all the main components together with the functionality and descriptions applied in this project.

Chapter 5 discusses the simulation circuit result and the results for this project.

Chapter 6 concluded the whole project findings and gave the recommendations for the future development of this project.

CHAPTER II

LITERATURE REVIEW

This chapter discusses about the theory and software that are use in the project. There are three main theories in this project that are the theories of microcontrollers, Proteus VSM 7.0 and also PICC Lite Compiler.

2.1 Microcontroller

Microcontrollers can be found in any products these days. For example modern washing machine in our house that consists of timer, button and LED contains a microcontroller [1]. All modern cars contain microcontroller. Digital electronics knowledge is essential in order to understand the way microcontroller works. However, with the existing of latest microcontroller like PIC16F877A from microchip, microcontroller works by writing programming code using C programming language. Everything becomes so simple by learning C programming and uses it to program the microcontroller.

Here are the examples of microcontrollers:

(i) PIC 16F870

(ii) PIC 16F871

(iii) PIC 16F872

(iv) PIC 16F873A

(v) PIC 16F874A

(vi) PIC 16F876A

(vii) PIC 16F877A

What is a Microcontroller?

A microcontroller is a small computer and it can only perform simple task [1].

Microcontroller consists of:

- Processor that executes programs. Processor execute program digitally. All instruction given to the processor should be in digital form.
-
- Program Memory to store the program that has been compiled successfully by the programmer.
- RAM (random-access memory) to store "variables."
- IO Port to connect sensor, keypad, LED, Relay and so on.
- Timer to count the time to execute some process.

2.1.1 Microchip PIC 16F877A Microcontroller Features

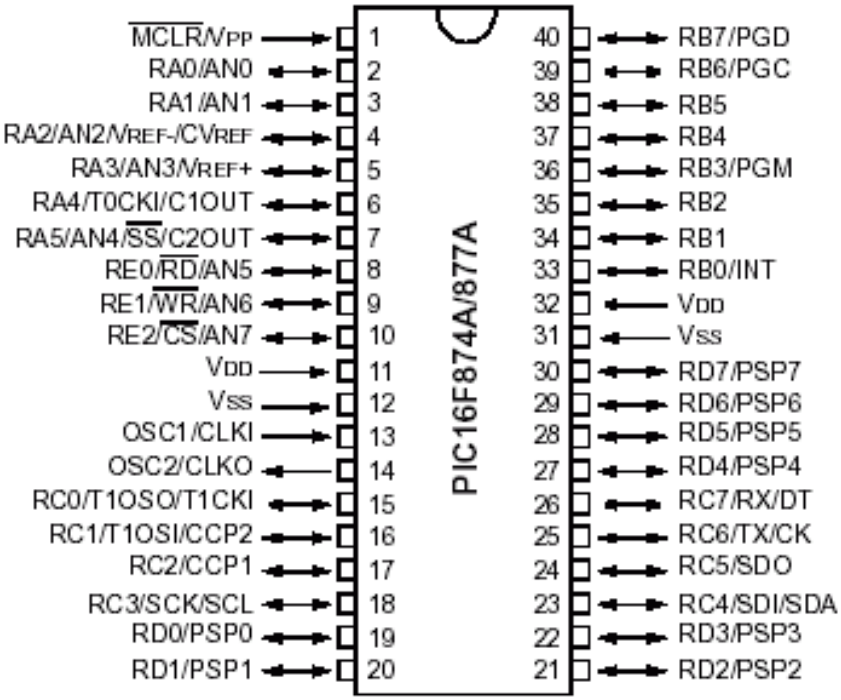

Figure 2.1: PIC 16F877A

High-Performance RISC CPU [10]

- Lead-free; RoHS-compliant
- Operating speed: 20 MHz, 200 ns instruction cycle
- Operating voltage: 4.0-5.5V
- Industrial temperature range (-40° to +85°C)
- 15 Interrupt Sources
- 35 single-word instructions
- All single-cycle instructions except for program branches (two-cycle)