ELECTRONIC CODE LOCK

NUR SUHANA BINTI ISHAK

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

May 2008

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : ELECTRONIC CODE LOCK

Sesi Pengajian : 2008

Saya NUR SUHANA BINTI ISHAK
mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (√) :

☐	**SULIT***	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD***	(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☐	**TIDAK TERHAD**	

(TANDATANGAN PENULIS)

Alamat Tetap: A-24 KG. BUKIT BERINGIN,

ULU RENGGOL, SEGA 27660

RAUB PAHANG D.M.

Tarikh: 9/5/2008

Disahkan oleh:

(COP DAN TANDATANGAN PENYELIA)

CHAIRULSYAH WASLI
Lecturer
Faculty Electronics and Computer Engineering (FKEKK)
Universiti Teknikal Malaysia Melaka (UTeM),
Locked Bag 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 9/5/08

"I hereby declare that this report is result of my own effort except for works that have been cited clearly in the references."

Signature : .....

Name : Nur Suhana Binti Ishak

Date : 9/5/2008

"I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the scope and quality for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honours."

Signature :.....

Supervisor's Name : Mr. Chairulsyah Wasli

Date :.....9/5/18.....

Special dedicated to my beloved parents, family and fellow friends, who had strongly encouraged and supported me in my entire journey of learning…

ACKNOWLEDGEMENT

Firstly, a lot of thanks and deepest gratitude to my supervisor, Mr. Chairulsyah Bin Wasli who has guide me a lot of knowledge and information regarding a final project, which is also known as Projek Sarjana Muda (PSM). Not forget, my inadequate to my parents, Mr. Ishak Mohamad and Mrs. Zaliah Binti Yusoh, family, friends, who never give up encouraging me, kind, helpful and supportive me a lot since the project begin. Thank you very much. Finally, for those who give a contribution in my training whether direct or indirectly involved thanks a lot. Completing my Projek Sarjana Muda with the title Electronic Code Lock successfully is the pleasant time for me.

ABSTRACT

This project is about Electronic Code Lock. It involve hardware and software. Code lock is a device built around PIC16F877A which act as interface between hardware and software. Electronic Code Lock activates an output when correct access code has been entered on a keypad. This code consists of six digits in the range 0 to 9.The code can be changed by user and is also remembered when the power is off. The main objective of this project is to produce low cost and user friendly electronic device. It is eminently suitable as an electronic door lock.

ABSTRAK

Kekunci kod adalah sebuah alat yang direka menggunakan PIC16F877A . Ia mengaktifkan keluaran apabila pengguna memasukka kod yang betul. Kod ini mengandungi 6 digit dalam lingungan nilai 0 hingga 9.Walaubagaimanapun, kod ini boleh ditukar melalui program dari PIC16F877A.Objektif utama projek ini adalah untuk menghasilkan kekunci elektronik yang berharga rendah dan mudah untuk digunakan. Projek ini melibatkan perkakasan dan perisian.

TABLE OF CONTENTS

LIST OF TABLE

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This is a device, built around PIC 16F877A,which activated an output when the correct access code has been entered on a keypad. This code consists of six digits in the range 0to 9.The code can be changed by the user and is also remembered when the power is off. A buzzer has been added to provide input feedback, the number of beeps indicates whether the input has been entered correctly or not. This circuit is eminently suitable as an electronic door lock.

The code lock has relay as output. When 6 digit code was pressed, the output will go to the 5V level and the relay will be energized .If the code is correct, the buzzer sounds a single beep. If it is incorrect, the buzzer will sounds twice.

A 12 V power supply is indicated, but in principle any voltage between 8V and 15V is allowed, provided of course that the relay is suitable for this voltage.For demo 9V DC voltage was used but for daily used AC supply will be used. In the in active state, the current consumption is about 2.5mA.

This electronic Code Lock is low cost because with price around RM50.00 compare to electronic door lock in market that cost around hundreds something. Beside it also really user friendly.

1.2 OBJECTIVE

The objective of this project is to develop Code Lock with hardware circuit and program it using software. This project shows the basic of developing a simple door lock system using microcontroller that was PIC16F877A, LCD display and keypad.

1.3 PROBLEM STATEMENTS

There are great variaties of electronic locks. Generally speaking, they can be classified into scores of types, such as digital lock, fingerprint lock, card lock, biological lock, etc. Among them the most practical and the most popularized one can come to electronic code lock. This kind of lock can avoiding the problems caused by the copying of keys. On the premise that its safety is high, its another feature without key is getting more and more favor of people. It is because the keys people carry have become burden most of the time, but by contrast people need only to remember a set of codes for electronic locks, and don't have to carry any key, thus freeing themselves from worries.

1.4 SCOPE OF PROJECT

While doing the project, the scope of work plays a very important role. In order to do in guideline method, student should fulfill the project requirement. The scope of this project is listed as below:

- To study the basic idea and operation of Electronic Code Lock.
- To identify the suitable type of PIC microcontroller for the project. To developed interfacing link between hardware circuit and software programming.
- To display the code and signal (success-id code correct and error if code incorrect) at LCD screen display .

1.5 THESIS OUTLINES

For thesis outline, whole thesis will be cover. This report was divided into five Chapter. Each part will cover on a topic required.

Chapter I will be cover on introduction of the project. A little bit of explanation of project will be discuss. It also includes the objectives, problem statements, scope of works, and the thesis outlines of the project.

Chapter 2 is a chapter, which covers on the literature review of the project. The main component in this project is Peripheral Interface device (PIC 16F877A) as interface between hardware and software. So more explanation about it will be discuss in this chapter.

As for the Chapter 3, it will project methodology. This chapter will focus more about method that had been used to completing the project accordingly. Flowchart provided include explanation.

Chapter 4 will be cover on result and analysis on final result .Each of the result and analysis which are done through out the project will be elaborated in detail and step by step until project's succession.

The last chapter is the Chapter 5, where it is an overall discussion and conclusion for the project. It also includes the future works of the project. It is important in order to assure that our objective is achieved.

CHAPTER 2

LITERATURE REVIEW

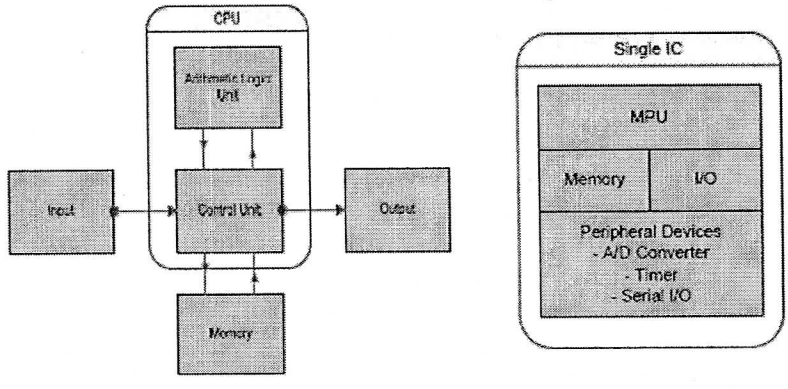
2.1 INTRODUCTION

Circumstances that we find ourselves in today in the field of microcontrollers had their beginnings in the development of technology of integrated circuits. This development has made it possible to store hundreds of thousands of transistors into one chip. That was a prerequisite for production of microprocessors , and the first computers were made by adding external peripherals such as memory, input-output lines, timers and other. Further increasing of the volume of the package resulted in creation of integrated circuits. These integrated circuits contained both processor and peripherals. That is how the first chip containing a microcomputer , or what would later be known as a microcontroller came about.

2.2 MICROCONTROLLERS VERSUS MICROPROCESSORS

Microcontroller differs from a microprocessor in many ways. First and the most important is its functionality. In order for a microprocessor to be used, other components such as memory, or components for receiving and sending data must be added to it. In short that means that microprocessor is the very heart of the computer. On the other hand, microcontroller is designed to be all of that in one. No other external components are needed for its application because all necessary peripherals are already built into it. Thus, we save the time and space needed to construct devices.

2.2.1 Comparison between microcomputer and microcontroller



Microcomputer Microcontroller

Figure 2.1: Comparison between Microcomputer and Microcontroller

2.2.2 Applications of the microcontroller

The application of the microcontroller is widely use in purpose control application as shows in the Table 2.1.

Table 2.1: Application of microcontroller

TYPE OF APPLICATION	EXAMPLES
Typical applications	Temperature control, smart instrument, GPS, digital lock, cell phone, etc.
Personal information products	Cell phone, pager, watch, pocket recorder, and calculator.
Laptop components	Mouse, keyboard, modem, fax card, sound card, battery charger.
Home appliances	Door lock, alarm clock, thermostat, air conditioner, TV remote, hair dryer, VCR, small refrigerator, exercise equipment, washer/dryer, microwave oven.
Toys	Video games, cars, dolls, etc.

Thus, the microcontroller will be used to implement the walking gait to control the movement of this project. It can be reprogrammed for many times and can program in various type of language like C, C++, basic pro, and assembly language.

2.3 OVERVIEW OF PIC MICROCONTROLLER

PIC stands for Peripheral Interface Controller. PIC microcontroller is one of the familiar products in Microchip Company. It based on Harvard Architecture, which is separated buses . Figure below shows the Harvard architecture block diagram.

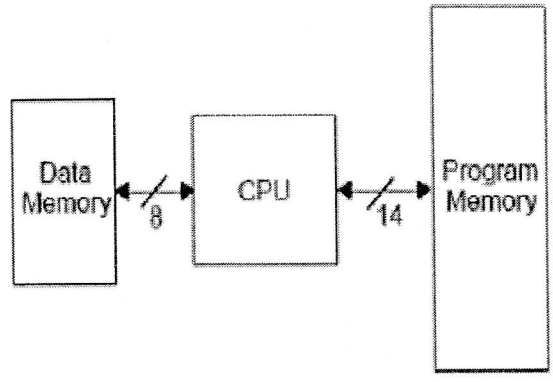


Figure 2.2: Harvard Architecture

2.3.1 Supplying the microcontroller

Generally, the correct voltage supply is importance for the proper functioning of the microcontroller system. It can easily be compared to a man breathing in the air. It is more likely that a man who is breathing in fresh air will live longer than a man who's living in a polluted environment.

For a proper function of any microcontroller, it is necessary to provide a stable source of supply, a sure reset when you turn it on and an oscillator. According to technical specifications by the manufacturer of PIC microcontroller, supply voltage should move between 2.0V to 6.0V in all versions. The simplest solution to the source of supply is using the voltage stabilizer LM7805 which gives stable +5V on its output. One such source is shown in the picture below.

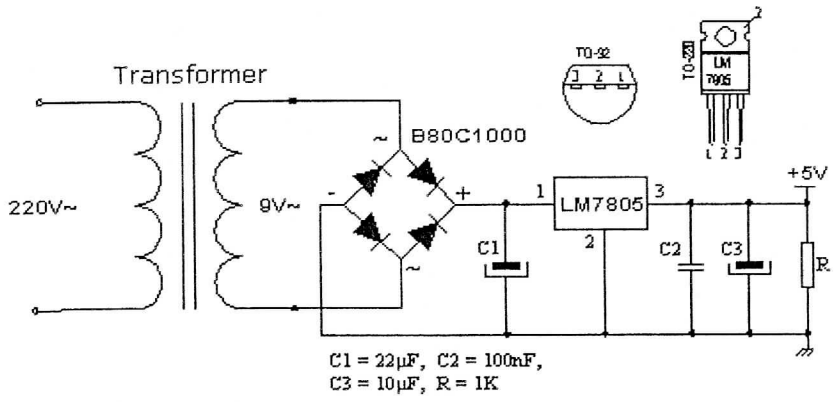


Figure 2.3: Supplying the microcontroller

In order to function properly, or in order to have stable 5V at the output (pin 3), input voltage on pin 1 of LM7805 should be between 7V through 24V. Depending on current consumption of device we will use the appropriate type of voltage stabilizer LM7805. There are several versions of LM7805. For current consumption of up to 1A we should use the version in TO-220 case with the capability of additional cooling. If the total consumption is 50mA, we can use 78L05 (stabilizer version in small TO - 92 packaging for current of up to 100mA).

2.3.2 Relay

The relay is an electromechanical device, which transforms an electrical signal into mechanical movement. It consists of a coil of insulated wire on a metal core, and a metal armature with one or more contacts. When a supply voltage was delivered to the coil, current would flow and a magnetic field would be produced that moves the armature to close one set of contacts and/or open another set. When power is removed from the relay, the magnetic flux in the coil collapses and produces a fairly high voltage in the opposite direction. This voltage can damage the driver transistor and thus a reverse-biased diode is connected across the coil to "short-out" the spike when it occurs.

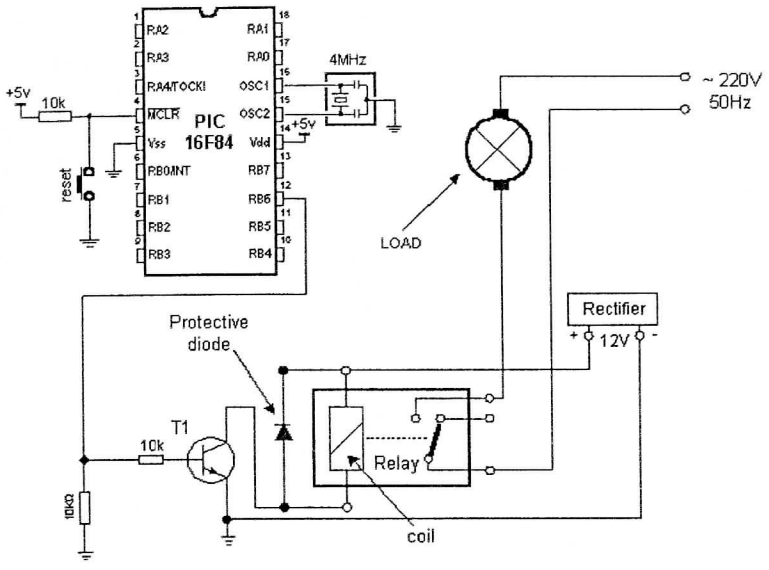


Figure 2.4: Connecting a relay to the microcontroller via transistor

Since microcontroller cannot provide sufficient supply for a relay coil (approx. 100+mA is required; microcontroller pin can provide up to 25mA), a transistor is used for adjustment purposes, its collector circuit containing the relay coil. When a logical one is delivered to transistor base, transistor activates the relay, which then, using its contacts, connects other elements in the circuit. Purpose of the resistor at the transistor base is to keep a logical zero on base to prevent the relay from activating by mistake. This ensures that only a clean logical one on RA3 activates the relay.

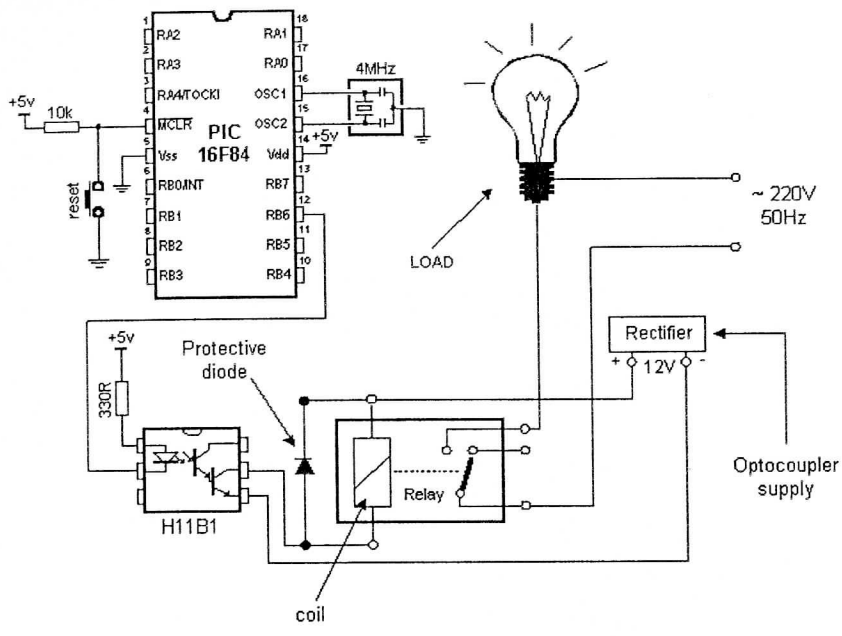


Figure 2.5: Connecting the optocoupler and relay to a microcontroller

A relay can also be activated via an optocoupler which at the same time amplifies the current related to the output of the microcontroller and provides a high degree of isolation. High current optocouplers usually contain a 'Darlington' output transistor to provide high output current.

Connecting via an optocoupler is recommended especially for microcontroller applications, where relays are used fro starting high power load, such as motors or heaters, whose voltage instability can put the microcontroller at risk. In our example, when LED is activated on some of the output port pins, the relay is started.