PROGRAMMABLE SOCKET USING PIC MICROCONTROLLER

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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

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Sesi Pengajian : 2009/2010

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To my beloved mother and father

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ABSTRACT

This project focuses on the programming of microcontrollers using a high level language. The PIC family of microcontrollers is chosen as the target microcontroller because of the low power consumption which made this microcontroller popular in portable application. This project entitles Programmable Socket using PIC Microcontroller. The Programmable Socket using PIC Microcontroller is an electric switch with a built-in clock that plugs into an electric socket, between the socket itself and a power plug. This physical arrangement allows the connected devices to automatically receive power for a desired duration of time. There are also time switches with several power plugs that can be independently programmed to turn on and off at specified times. The Programmable socket can be controlled by setting the timer as required by users. The objectives of this project are to design and develop the Programmable socket by using the PIC Microcontroller. To achieve the objective, the PIC16F877A is use as to program the time as required by user. Beside, the LCD also connected to PIC microcontroller that provides time display, which is used to control the switches at home appliances by day repeatedly during different periods of time. For application, this product would be applied at house, office, laboratory, factory and many more and it will benefit to peoples life easier. This Programmable Socket sets as easily as a digital alarm clock to turn a lamp (or other appliance) on and off once per day.

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ABSTRAK

Fokus utama yang diketengahkan dalam projek ini ialah pengaturcaraan pengawal mikro menggunakan bahasa tahap tinggi. Pengawalmikro famili PIC ini dipilih sebagai sasaran pengawal mikro disebabkan penggunaan kuasa rendah yang mana menjadikan pengawal mikro ini terkenal dalam aplikasi yang mudah dibawa.Tajuk projek ini ialah Soket yang telah dipengaturcaraan pengawal mikro PIC. Soket yang telah dipengaturcaraan pengawal mikro PIC ialah sejenis suis elektrik yang dipasang bersama dengan pengawal mikro PIC dan disambung kepada soket elektrik. Susunatur fizikal ini membenarkan alatan elektrik berhubung secara automatic untuk menerima kuasa elektrik pada masa yang ditetapkan. Ia juga suis masa dengan beberapa palam kuasa yang boleh diaturcara sendiri untuk mula dan tamat pada masa yang lebih spesifik. Soket yang telah diaturcara ini juga boleh mengawal masa mengikut yang ditetapkan oleh pengguna. Objektif projek ini ialah untuk mereka dan membuat Soket yang telah diaturcara pengawal mikro PIC. Untuk mencapai okjektif, PIC16F877 telah digunakan sebagai aturcara untuk mengawal masa yang telah ditetapkan oleh pengguna. Selain itu, paparan LCD juga disambung kepada pengawal mikro PIC yang dilengkapi dengan paparan masa mengikut masa yang berlainan. Produk ini diaplikasikan di rumah, pejabat, makmal, kilang dan sebagainya dan ia dapat memberi kelebihan kepada kehidupan manusia. Soket yang telah diaturcara pengawal mikro PIC ini mudah digunakan sama seperti penggera jam digit untuk memasang dan memadam lampu (atau peralatan elektrik lain) pada sesuatu masa yang ditetapkan.

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CHAPTER I

INTRODUCTION

This chapter will be discussed on the project overview. The objective, scope, and thesis outline will be presented in this chapter.

1.1 Project Background

This project focuses on the programming of microcontrollers using a high-level language. The PIC family of microcontrollers is chosen as the target microcontroller because of the low power consumption which made this microcontroller popular in portable application [1]. The Programmable Socket using PIC microcontroller is a set of switch control device in which a single chip microprocessor is the core working together with an electronic circuit. It incorporated a 16x2 LCD display with a 4x4 keypad. LCD will display the time status. The socket can be controlled by setting the timer as required by users. Relay is used to control the other circuit for switch ON or switch OFF the socket. The microcontroller (PIC) will be programmed in order to control the timer.

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The Programmable Socket is applied to controlling electrical appliances. Its benefits are energy saving, automation, security-purpose, reduced standby power consumption and economic. The electrical appliances that may use are lamps, fans, small appliances, coffee makers, fish tanks, TV, fax machine, scanner, and many more.

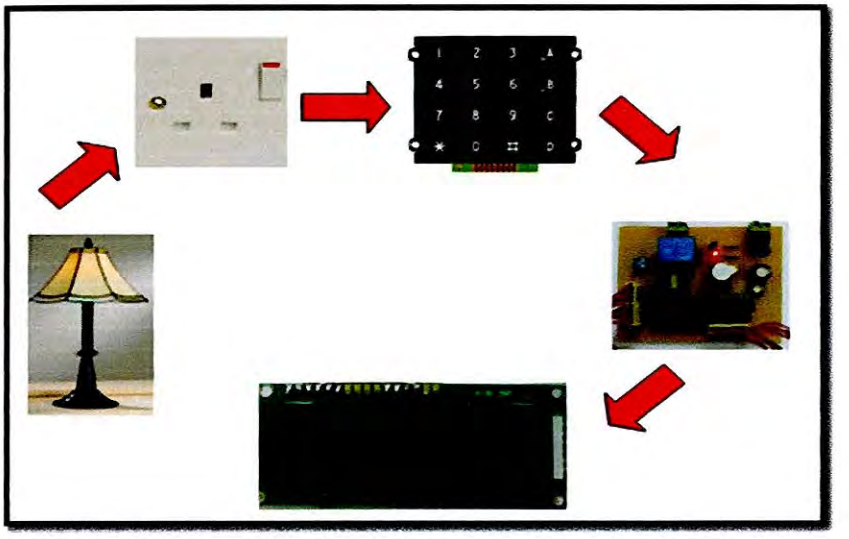

Figure 1.1: Flow of the system.

Figure above explained the processes which are:

i. The process starts when the user connecting an appliance to the socket.
ii. After that, user needs to insert the real time clock and user can choose what time that they want to ON/OFF the timer.
iii. Then, the information would be transmitted to microprocessor as a main part of the system.
iv. Then LCD will display the time status.

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1.2 Objective

The objective can be summarized as below:-

i. To use PIC as a main remote device.
ii. To design the Programmable socket by using the PIC Microcontroller.
iii. To construct the hardware circuit between PIC that is connected to LCD, keypad and socket.
iv. To program the PIC that is able to control the timer for programmable socket controller.
v. To enhance the knowledge on PIC
vi. Program the PIC as interfacing.
vii. Integrated with schematic and analysis.

1.3 Problem Statement

The socket that currently used in the market is only to connect the electric appliances to the power source. Now a socket by using analogue timer is already produce but it is still not reliable. Hence, that is why the Programmable socket was proposed as the solution for this problem.

1.4 Scopes

This project is subjected to several scope and limitations that are narrowed down to the study.There are a few scopes and guidelines listed to unsure the project is conducted within its intended boundary. This is to ensure the project is heading in the right direction to achieve its intended objectives. The scopes are:-

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i. Study about the programming of PIC Microcontroller and study the operation of this project.

ii. Develop the schematic design for all the components.

iii. Program the PIC Microcontroller for Programmable socket and run the simulation.

iv. Develop the hardware and testing.

1.5 Project Methodology

i. Project planning.

ii. Literature review.

iii. Software design and circuit construction.

iv. Relay circuit design and construction.

v. Performance analysis.

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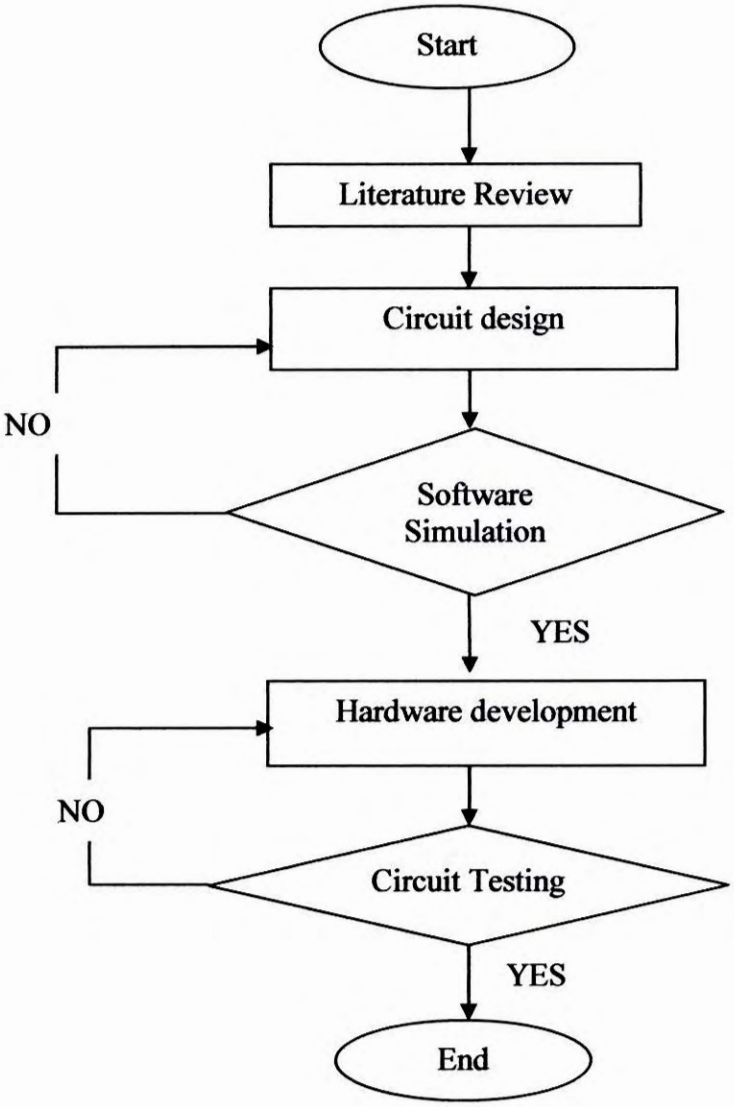

Figure 1.2 General Flowchart of the Project

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1.6 Report Structure

This report consists of chapters that will explain and discuss more details about this project divided into five chapters. Chapter one gives a brief explaination about Programmable Socket using PIC Microcontroller. It also gives an introduction about the overall process of project.

Meanwhile chapter two discuss about the literature review of the project. In this part, there are some details about the background knowledge of mikroC Compiler, the best PIC microcontroller for this project. Literature review will produce overall structure of this project.

Chapter three will explain about the project methodology. Project methodology give details about the method used to solve the problem to complete the project. The method used such as collecting data method, process and analysis data method. The chapter contains the flow chart which explains the overall method taken along the project carry out. Besides that, this chapter also introduces the construction of the project, which involves hardware development and software development.

Chapter four consists of result and discussion of the project, finding and analysis throughout the research and project development. It inevitably shows how precise the hypothesis could be realization.

Lastly, chapter five will explain about the project conclusion. This chapter rounds up the attained achievement of the whole project and reserves suggestions for possible future researches.

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CHAPTER II

LITERATURE REVIEW

This project is divided into few parts which consist of microcontroller, electronic keypad, relay and LCD display. The division is for easy development and implementation. Each part can be test and work independently. At the end of the project, all of the parts will be connected together to form the complete security system.

An approach to complete this project will be discussed in this chapter. It consists of the hardware part and software part.

2.1 Microcontroller PIC16F877

The PIC 16F877 is a microcontroller that has many features in a 40-pin DIP package. Microcontroller will be used as driver for the LCD display. Currently known PIC will be PIC 16 F 877 manufactured by MICROCHIP [10]. Market available LCD driver chip may be used to replace PIC. Aside from programming, other characteristics of the PIC MCU have to be known in order to enable the MCU to function properly. An important aspect is the interference caused by the PIC itself because of the clocking set for it to function. It will cause interface. Thus a shielding procedure is needed such as to cover the body of PIC with EM conductor shielding

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tape or by placing ground plane around the PIC in PCB circuit board design. Figure below is the condition of a PIC 16 F 877 shielded with a shielding tape.

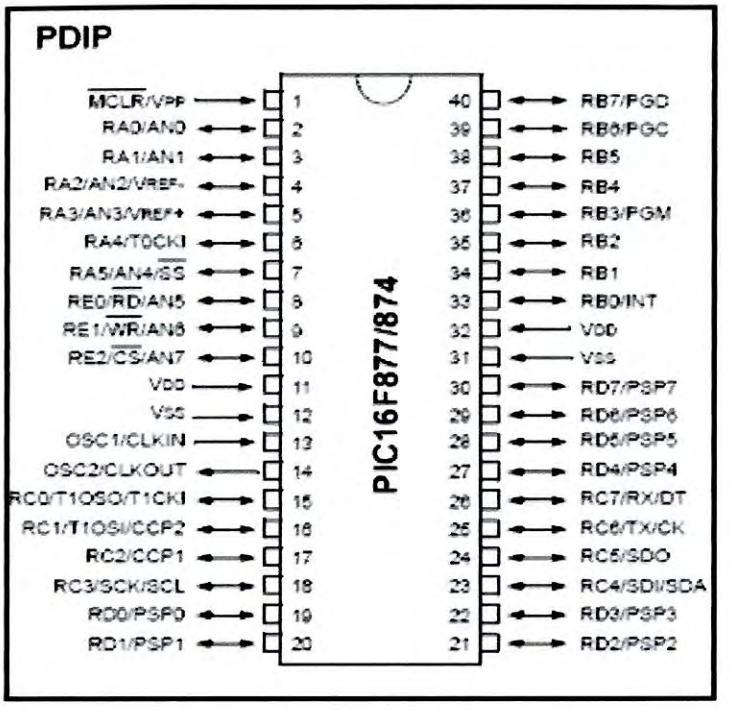

Figure 2.1: PIC 16 F 877 [10]

2.1.1 Memory

The PIC 16F877 microcontrollers carry a large memory array, which can be divided into three types:

i. Flash Program Memory
ii. EEPROM Data Memory
iii. Data RAM

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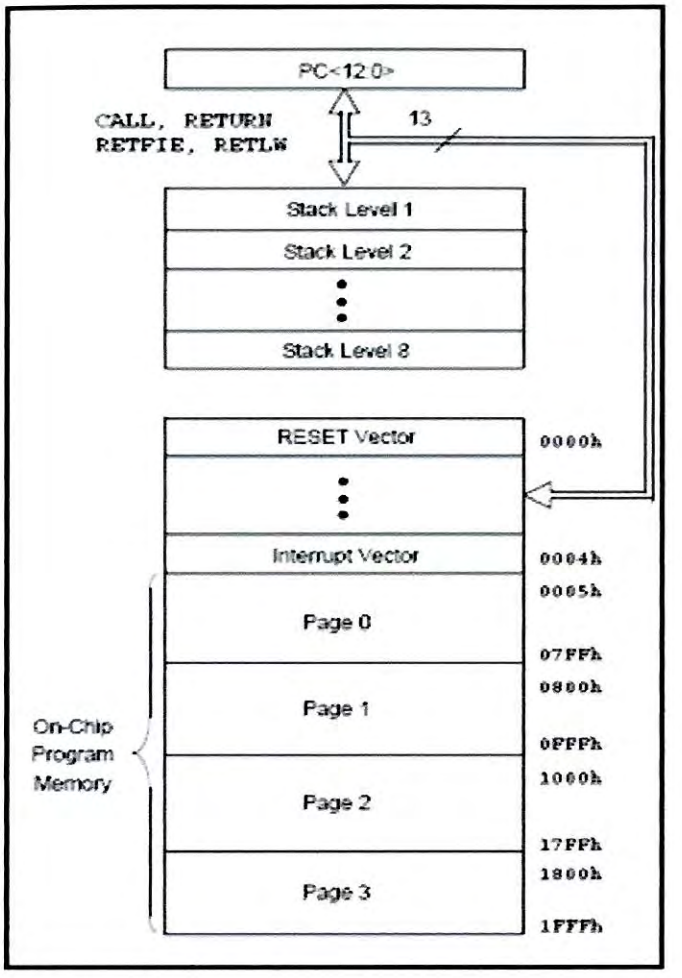

Figure 2.2: PIC 16F877 Program Memory Map and Stack [10]

2.1.2 Flash Program Memory

The entire program memory is made up of flash array. The PIC 16F877 has 8K bytes of flash program memory [10]. Every single byte of flash program memory can be erased and reprogrammed. This can be done either in a conventional PIC programmer such as economical PICSTART units available from Microchip or can even be done during an application. And all this can be done by a small user code resident in program memory, without requiring any external higher programming voltage this level of flexibility is very beneficial in today fast pace development, where product updates and modifications are routinely carried out in the field.

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