

MULTICHIP PROGRAMMER BOARD

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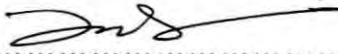
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*I dedicate this to my beloved  
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especially Miss Norpizah Januddin and Mr. Mustakim Mukhtar;  
all my friends, supervisor and all lecturers of Faculty of  
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## ABSTRACT

In education, training board is the one of the important stuffs to assist students to do the training practically. Existing training boards usually available in every lab including Faculty of Electronic Engineering and Computer Engineering (FKEKK) Microprocessor lab at University of Malacca Malaysian Technical (UTEM). The problems arise when lecturers or students are going to implement chips produced by other manufacturers. It's occurred because training board used by FKEKK just capable to program a series of single manufacturer chip only. The project looks into this matter, which is has a possibility to design multi chip programmer board that interface with existing Motorola 68000 input/output boards. Microcontroller manufactured by Microchip, Motorola, Intel and Complex Programming Logic Circuit (CPLD) manufactured by Xilinx can be program and execute on the same programmer board. Nevertheless, only one microcontroller or CPLD will operate in one time. The board interfaces used to connect the programmer board to computer through serial communication. Meanwhile, the input/output board can be connected to the programmer board by using 40 pin flat cables.

## ABSTRAK

Di dalam bidang pendidikan, alat bantu belajar merupakan sebahagian alat yang penting dalam membantu pelajar membuat latihan secara praktikal. Setiap makmal mempunyai alat bantu belajar yang mempunyai fungsi tertentu dan ini termasuklah di makmal Mikropemproses Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer (FKEKK), Universiti Teknikal Malaysia Melaka (UTEM). Alat bantu belajar yang digunakan untuk memprogram cip kawalan mikro hanya mampu untuk memprogram satu jenis cip dari satu pengeluar secara sesiri. Masalah yang wujud adalah apabila pensyarah atau pelajar ingin menggunakan alat bantu belajar kawalan mikro dari pengeluar yang berbeza. Dengan merujuk kepada masalah yang dihadapi, projek yang di kenali sebagai Alat Pemprogram Pelbagai Cip di reka dan di sambungkan dengan alat masukan dan keluaran Motorola 68000. Pengeluar kawalan mikro seperti Microchip, Motorola, Intel dan Complex Programming Logic Circuit (CPLDs) dihasilkan oleh Xilinx mampu diprogramkan dan dilaksanakan pada satu alat pemprogram. Namun begitu, hanya satu cip kawalan mikro akan beroperasi pada satu masa. Antaramuka yang digunakan untuk menghubungkan alat pemprogram ini dengan komputer adalah menerusi komunikasi sesiri. Sementara itu, kabel 40 pin digunakan untuk menghubungkan Alat Pemprogram Pelbagai Cip dengan alat masukan dan keluaran.



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## LIST OF ABBREVIATIONS

ADC	-	Analog Digital Controller
CPLD	-	Complex Programmable Logic Devices
CPU	-	Central Processing Unit
DC	-	Direct Current
DDR	-	Data Direction Register
EEPROM	-	Erasable Electrical Programmable Read Only Memory
IC	-	Integrated Circuit
I/O	-	Input/ Output
JTAG	-	Join Test Action Group
LED	-	Light Emitting Diodes
PIC	-	Peripheral Interface Controller
RC	-	Resistance Capacitance
RISC	-	Reduces Instruction Set Computer
SOIC	-	Small Outline Integrated Circuit
USB	-	Universal Serial Bus

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## **CHAPTER I**

### **INTRODUCTION**

The purpose of development training board is to provide general experiment based interfacing module, aiming to introduce users to microprocessor, microcontroller and microcomputer. It is designed to provide users an appropriate method to attain skills required to develop a control systems that responds to a real time events. The training board can be done by integrating the several experiment modules into one board to provide users with a wide range of topics input output interfacing hands on experiment. The board offers a rich set of features that make it suitable for use in a laboratory environment for university and college courses.

A microcontroller is a useful device and it also use in laboratory education. Akin to a very specialized CPU, a microcontroller is small, consumes very little power, and can be programmed to quickly and reliably perform a wide variety of tasks. Microcontrollers can be found in things used every day such as microwaves, remote controls, and vending machine. In educational, microcontroller chip is use to look that the basic functionality such as controller, displayed and so on.

#### **1.1 Overview**

This project attempts to achieve as same functionality as an each microcontroller programmer and at the same time it also can execute. Furthermore, the focus of this project was to create a Multichip Programmer Board that capable to

program multi types of microcontroller chips by difference manufacturer, which program the chip by using serial or parallel communication. This programmer will have connected to input output board by using 40 pin flat cables. The software also used to compile the source code into hex file and program the chip.

## **1.2 Problem Statement**

The microcontroller programmer boards which already in the laboratory capable to program one of manufacturer product. In order to use different manufacturer chips, faculty needs to buy other programmer with same function of input/output board. This will incur some high budget and laboratory house keeping problems.

## **1.3 Objectives**

The problem statement can be solve by integrated the several microcontroller chips into one board. Therefore, this project is trying to combine several manufacturers product used by lecturers and student on board. Thus, it will reduce the cost and easy to house keeping. The other objectives of this project are:

- i. To program one chip at one time
- ii. To execute with input output board
- iii. To program using serial communication
- iv. To connect to input output board using 40 pin flat cable

## **1.4 Scopes**

This project is a hardware-based project. A programmer will be designed that capable to program several microcontrollers and CPLD from different manufacturers. The programmer circuit should compatible to the software provide by manufacturer such as MPLAB or ICProg, 8051 compiler, 68HC compiler and Xilinx.

## 1.5 Methodology

There are few steps used in the project. That include:

i. Literature and review

Study and research about the microcontroller programmer has been used into developing the Multichip Programmer Board. The method used are finding and study about journal, articles, application notes, all data and books including the procedure on designing programmer boards and their schematic. The software that used to compile the microcontroller also has been studied.

ii. Circuit development

Study the steps how to design schematic and Printed Circuit Board (PCB) schematic using Protel DXP.

iii. Hardware development

Study and learn the step to fabricate the Printed Circuit Board from the print circuit, etching, drilling and soldering into the PCB board. After that, testing must be done to ensure the circuits will properly working as expected.

iv. Report writing

Report writing is the last stage to be finished and submitted for the PSM 2 requirement.

## 1.6 Thesis Layout

This thesis consists of five chapters that describes in detail and clearly about this project. The chapters are stated as follows:

i. Chapter one: Introduction

Project introduction is the straightforward overview of the developed project. It started with presents the importance of this project and motivation of the

projects. Next, the problem statement is discussing about the related issue to find the suitable solution to improve the existence situation. After that, the project objective is mentioned which is about the goal that will be achieved at the end of the project. Then it follows with the scope of work that will state the project work scope specification and every expectation during the progress of project. It also coats the limitation and constrain for certain project and the confirmation about the material that is used in the development of the project such as the hardware, component and the design used. The second last part in this chapter is overview methodology where it is discussing about the methods use to develop this project. The specific methodology will be discussed in detailed separately. This chapter is enclosed with the overall structure contained in this thesis.

ii. Chapter two: Literature Review

In this chapter discusses the study and all the information that are related to this project. Each the fact and data are gathered through the different source of references in order to choose the best resource to implement in this project. Largely of the literature will produce the work concept that shows the relation between the project research and the theory and the concept through diagram or the suitable model. Some of the content in this chapter are the description about the perspective and methods that are used in the previous research and the prediction how far this project is being related to current research and theory. It also show the theory and concept used in solving project problem. Explanation regarding the objectives of the project in wider range of research field also attach in this chapter. Brief discussion about the hypothesis of the research methodology is also included.

iii. Chapter three: Methodology

This chapter explains the methodology of implementation for this project in detail. Some of the important parts of this chapter are the technique and the approach that is used such as the orderliness to collect data, methods of processing and analysis, model, and flow chart. Considerate factors in choosing data or certain approach has included.

iv. Chapter four: Result and Discussion

In this chapter the new invention or result are reported with support of diagram and pictures. Analysis on circuit and connection is also described and compare with the previous result. The results are evaluated through the objectives and project problem perspective.

v. Chapter five: Conclusion and Suggestion

The final year project thesis is enclosed with the conclusion and the summary on the research and project that was done. It also contains the summarization of the project finding, analysis of the result and the suggestion for the future research and improvement. Some problem arise is also discussed while the project is develop.

## CHAPTER II

### LITERATURE REVIEW

In this chapter, theory and concept of the entire project are explained. Literature review or background research is a one method for explaining the perspective and theory is used in this project. In that case for develop Multichip Programmer Board; literature is done with collect the information for journal, book, internet and application note. The project focus as on the programmer chip and training board of Peripheral Interface Controller (PIC), Intel, Motorola and Complementary Programmable Logic Devices (CPLD). The connection between computer and programmer board using serial cable is also reviewed. 40 pin flat cables are explained too for connection between programmer board and development board or input output board.

#### 2.1 Background Study



Figure 2.1: (a) Microcontroller chips and (b) Programmer

For years ago, the application of microcontroller is more flexible and powerful than hardware. Microcontrollers are sophisticated logic devices, whose main function is to transform data using the controller's central processing unit and input and output system. By the convenient prices, microcontroller may possibly successfully replace the standard hard wire version. Microcontroller is a type of computer on chip as called integrated circuit (IC) which is designed for simple controlling devices or system. However, to make the microcontroller to function as required, it needs to program earlier.

Originally, microcontrollers were only programmed in assembly language and later in C code. Recent microcontrollers integrated with on chip debug circuitry accessed by in circuit emulator via JTAG enables a programmer to debug the software of an embedded system with a debugger. Some microcontrollers have begun to include a built in high level programming language interpreter for greater ease of use.

The compiler is use to writing the code program by using programming language such as C, assembly and others. To program the microcontroller, the programmer is compulsory to convert the source code from C file (.C) or assembly file (.asm) into hex file (.hex). The equipment is use to program the microcontroller chip is called programmer. The programmer can program the microcontroller that has 8 bit or 16 bit and etc.

The function of microcontroller is determined by the source code writing. If the microcontroller is use to different function, it just changes at the program. The related software to write the source code such as a Mplab, SouceBoost and so on, though the software is use to program the microcontroller by convert the source code into hex file such as IC-Prog, PIC-Shell, PICC and etc.

For program the microcontroller, the programmer could have connection between the computer and programmer. The connection between the devices can be making into three ways either through the serial cable, parallel cable or usb cable.

## 2.2 Literature Review

Nowadays, the used of microcontroller programmer in laboratory session seems to be important. For the past few years, microcontroller has been developed rapidly for control the device or system. The increasing in research and development and also the technology used day by day have improved the microcontroller chip. The development of programmer is built by combining with the training board for education used. The microcontrollers training or education boards are program and execute one chip manufacturer only.

There are many types of microcontroller in market by different manufacturer such as Microchip, Intel, Motorola and Xilinx. By the research perform; the programmer has built separately with input and output education board. But it just can programmer the microcontroller and it cannot connected to education board for execute. Through literature review, the programmer has a built in on the education board education. The example of education board is shown in figure 2.2 [5].

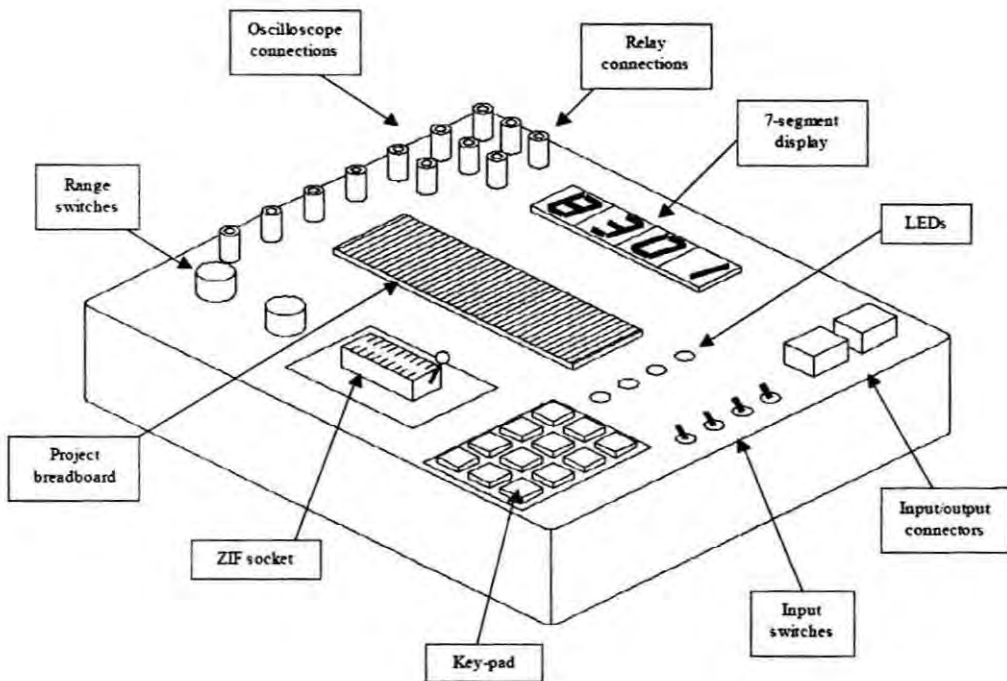


Figure 2.2 : Layout Microcontroller Education Board [5]