

IMPROVISED BRAILLE TO VOICE CONVERTER BY USING PIC  
MICROCONTROLLER

RAFIZAH BINTI MOHD. YAHYA

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

Faculty of Electronic and Computer Engineering  
Universiti Teknikal Malaysia Melaka

MAY 2011



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FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

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<b>Tajuk Projek</b>	:	IMPROVISED BRAILLE TO VOICE CONVERTER BY USING PIC MICROCONTROLLER
<b>Sesi Pengajian</b>	:	2010 / 2011

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Supervisor's Name : Mr. Adie Bin Mohd Khafe

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*To My Beloved Mother, Father and Family*

## ACKNOWLEDGEMENT

First of all, I am thankful to Allah, the Almighty, and the Merciful for His blessing and guidance that has inspired me through this project which was able to be completed within the required time and gain enormous knowledge that is useful for the future undertaking.

My utmost gratitude goes to my respected supervisor, Mr. Adie Bin Mohd. Khafe for his ongoing comments, sharing knowledge and advise as he guides me through making the appropriate research as an engineer.

I also would like to take the opportunity to express my appreciation to the individuals that had helped me directly and indirectly throughout completing this project. Especially to my best friends and coursemates for always being supportive, dropping opinions and comments. A million thank you for all of you and I wish all the best in life and hope that our friendship everlasting.

Last but not least, a special thank you to my beloved family who always being supportive, especially my parents and my sisters who always encourage me, and give the strength during facing a lot of obstacles while completing this project. All of your support physically and mentally indeed giving me lot of joy.

Thank you.

## ABSTRAK

Projek ini adalah berkenaan untuk merekabentuk penambahbaikan penterjemah Braille dalam bentuk suara dengan menggunakan Mikropengawal PIC. Umumnya, projek ini adalah gabungan dari perkakasan dan perisian yang terdiri daripada kombinasi sensor, pembeding, mikropengawal “Peripheral Interface Controller”(PIC) dan Speaker. Projek ini adalah bertujuan untuk membina produk yang dapat membantu orang cacat penglihatan semasa latihan menggunakan Braille. Semasa latihan ini, orang cacat penglihatan ini akan melakukan latihan membaca kata Braille di mana mereka akan menyentuh titik Braille dan cuba untuk membacanya. Di sini, peranti ini akan membantu orang buta, dengan memberitahu pengguna tentang apa yang sebenarnya jawapan dari titik Braille melalui suara yang keluar samada mereka baca adalah benar atau salah. Kombinasi sensor yang tepat digunakan untuk mengesan titik Braille dan menukar maklumat ke dalam bentuk audio.

## ABSTRACT

This project is about to design an improvised of Braille to Voice Converter by using PIC Microcontroller. Generally, the project is a combining of hardware and software that consists of the combination sensor, the comparator, the “Peripheral Interface Controller” (PIC) microcontroller and Speaker. This project is to develop a product where it can be help the Blind Person in their Braille Training. During this training, this person will do exercise of Braille word reading where they will touch the Braille dot and try to read it. Here, this device will help the blind person, by informing the user of what actually the answer of the Braille word via voice that comes out whether what they read is correct or wrong. The combination of appropriate sensor is used to detect the Braille dot and convert the information into an audio.



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## LIST OF ABBREVIATION

A/D	-	Analog to Digital
ASM	-	Assembly Language
BASIC	-	Beginners, All-purpose Symbolic Instruction Code
CPU	-	Central Processing Unit
D/A	-	Digital to Analog
DC	-	Direct Current
DLL	-	Dynamic Link Library
HRL	-	Hughes Research Laboratories
I/O	-	Input/ Output
I <sup>2</sup> C <sup>TM</sup>	-	2-wire Inter-Integrated Circuit
IBIAS	-	Bias Current
ICD	-	In-circuit Debugger
IR	-	Infrared Sensor
LED	-	Light Emitting Diode
MIST	-	Mosaic Infrared Sensor Technology
PCB	-	Printed Circuit Board
PIC	-	Peripheral Interface Controller
PSRR	-	Power-supply rejection ratio
PWM	-	Pulse Wave Modulation
RAM	-	Random Access Memory
RISC	-	Reduced Instruction Set Computer
ROM	-	Read Only Memory
SPI <sup>TM</sup>	-	Seriap Peripheral Interface

UART	-	Universal Asynchronous Receiver/Transmitter
USART	-	Universal Asynchronous Receiver Transmitter
USB	-	Universal Serial Bus
VHYST	-	Hysteresis Voltage
VOS	-	Offset Voltage
Vref-	-	Negative Voltage Reference
Vref+	-	Positive Voltage Reference
VTRIP-	-	Lower-level Trip Value
VTRIP+	-	Higher-level Trip Value
XTAL	-	Crystal

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Background Project**

This project is about to complete the prototype version of Braille to Voice converter by using PIC microcontroller. This project is to develop a product where it can help the Blind Person in their Braille Training. During this training, this person will do exercise of Braille word reading where they will touch the Braille dot and try to read it. Here, the combination sensor will play their role to sense the height of Braille dot and represent it in binary code. Microcontroller then interpret the binary code and convert it in terms of audio. The output will come out via speaker.

#### **1.2 Problem Statement**

Braille writing commonly used by blind person. Since the blind person just can hear but did not see, so they need to use this Braille writing in reading or writing. In this case, they should to learn first before they can use it. With Braille converter, it is very helpful for those who are just starting to learn Braille writing. This system will help

them to know the sounds of every single word in Braille writing and make them easily to understand.

### **1.3 Objective**

To construct a prototype of improvised Braille to Voice converter for purpose of aiding blind person in their Braille reading training.

In order to ensure that the project objectives are met, one should:

1. To sense dots in Braille character cell using the combination sensor of Fiber Optic and IR Sensor.
2. To develop PIC program to convert binary Digital output into audio form

### **1.4 Scope**

1. Construct a prototype of Braille detector and convert it into Audio Form.
2. Develop a PIC program can convert signal into audio signal.
3. Ensure that both of the scope above can be constructed and developed.

### **1.5 Methodology**

There are several steps that should be done in order to achieve the objective. This project starts with the literature review about hardware and software used in this projects. It then comes together with attending courses such as about PIC Microcontroller and other courses available that related to this projects. Next, study the

C language and simulation using PIC C Compiler Software. Then, the circuit was design using the simulation software, Proteus 7 to simulate the circuit and inserting the Microcontroller's programming. After doing simulation and analyzing on the circuit, the prototype of the circuit is construct and testing. Troubleshoot the prototype if it is not functioning as expected.

## **1.6 Project Outline**

This report divides to five chapters where Chapter 1 is an introduction of this report which explains briefly about this project. This chapter includes the project introduction, project objective, problem statements, scope of work, brief explanation about project methodology and the project outline.

Chapter 2 is literature review about the details research on the Braille character, PIC Microcontroller, Combination of Infrared sensor and Fiber Optic, and other theory related with this project.

Chapter 3 is project methodology which is explain about the whole method being used for this project. This chapter contains the methods used from collecting data, processing and analyzing of data and flowchart.

Chapter 4 covers about the simulation and practical results of Hardware and Software circuit used in this project.

Chapter 5 is conclusion of this project. Suggestion regarding on this project can be done on this chapter.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Introduction

In this project, several methodologies have been employed and need to be understood thoroughly. This chapter covers the study of Braille Writing Character, Combination of Sensors consists of Infrared Sensor and Fibre Optic Sensors, PIC 16F877A in terms of Hardware and Software.

#### 2.2 Braille

Braille writing is a tactile writing system used by blind people. It was invented by Louis Braille of France who was blinded in a childhood accident. Braille is a system of embossed signs which are formed by using combinations of six dot, arranged and numbered thus:



**Figure 2.1: Invention of 6 Dots of Braille**

The signs are embossed on special paper, either by hand with a tool called a style which is pressed into the paper through holes in a perforated frame, or by using a braille writing machine, such as a Perkins Braille, or by an embosser connected to a computer.

A simple sign, for example a sign denoting a letter, occupies one space or “cell”. A blank space is left between words, and between the end of one sentence and beginning of the next.

In this primer the dots in the cell will be indicated thus:1,2,3 and 4,5,6, to denote the left and right hand of the cell respectively.

The duty of a transcriber is to convey to the reader as exact a representation of the printed copy to be transcribed as is possible or feasible.[1]

### **2.2.1 Applications of Braille**

There are several applications of Braille that can be stated nowadays. Braille can be used in music, mathematics, tactile representations and so on. [2]

- i. Braille in Music – Braille is really helped the musicians who is visually impaired that cannot see the standard print music notations so that they can make use the Braille music. This is one of the type of Braille Code that helps person to write music in Braille. Like traditional Braille with  
  
the six dots, the same structure used but it represented in different meaning. It also have its own abbreviations.
- ii. Braille in Mathematics – It can represent the symbol of mathematical operations, character and notations. Thus, helped the blind people to read, write and compute the mathematical equations.
- iii. Tactile Representation- Braille also gives blind people the chance to feel and understand graphs, diagrams, and simple pictures.