MORSE CODE TRANSLATOR USING PIC

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This report is submitted in partial fulfillment of the requirement of the award of Bachelor of Electronic Engineering (Telecommunication Electronics) with Honours

Faculty of Electronics and Computer Engineering

Universiti Teknikal Malaysia Melaka

April 2009

UNIVERSTI TEKNIKAL MALAYSIA MELAKA

FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN

PROJEK SARJANA MUDA II

Tajuk Projek	:	**MORSE CODE TRANSLATOR USING PIC**
Sesi Pengajian	:	**2008/2009**

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ACKNOWLEDGEMENT

Alhamdulillah, thank god for his blessing and for my parents and my family that supported me. I would like to express my gratitude to Mr. Azahari Bin Salleh for being a helpful supervisor. Also to my friends, lecturers and those who have been so supportive upon the completion of this project, thank you very much.

ABSTRACT

During the first half of 20th century, Morse Code communication using telegraph line serves as dominant communication system in the world. It has been adapted to be used in radio transmission later. However, with the advent of telephones and internet, this communication mode dropped to second place of choice due to difficulties to operate and low data rate. Because of the true reliability of Morse Code communication (using On-Off keying), it has been used for backup communication and also serves when other modes fail. Realizing the need of this communication mode is still exist, this project made to build a Morse Code translator system using PIC. PIC will be implemented in this project to make a simple, easy to use and mobile system that can translate Morse Code into text. The system is aimed to help a Morse Code operator to translate Morse Code sound in real time application and without error.

ABSTRAK

Komunikasi menggunakan Morse kod melalui sistem telegraf digunakan dengan meluas semasa kurun ke-20. Kemudian, penggunaan radio diaplikasikan dalam penghantaran Morse kod. Bagaimanapun, dengan penciptaan telefon dan Internet, komunikasi dengan cara ini tidak lagi digunakan kerana sukar untuk digunakan dan kadar data yang rendah. Dengan menggunakan teknik "On-Off Keying", Morse Kod sesuai digunakan sebagai sistem komunikasi sokongan. Menyedari kepentingan ini, projek ini dijalankan untuk menghasilkan pentafsir Morse kod menggunakan PIC. PIC digunakan untuk memudahkan penggunaan, mudah alih dan juga mampu menafsirkan Morse kod ke dalam tulisan abjad. Sistem ini diharapkan dapat membantu pengguna mentafsir Morse kod dengan segera tanpa sebarang kesilapan.

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LIST OF ABBREVIATION

PIC	-	Programmable Interface Controller
ADC	-	Analog To Digital Converter
MCU	-	Microcontroller Unit
AC	-	Alternating Current
DC	-	Direct Current
US	-	United States
ITU	-	International Telecommunication Union
ARRL	-	American Relay Radio League
SOS	-	Save Our Souls
PC	-	Personal Computer
OOK	-	On-Off Keying
CPU	-	Central Processor Unit
I/O	-	Input / Output
VCO	-	Voltage Controlled Oscillator

LCD	-	Liquid Crystal Display
PCB	-	Printed Circuit Board
IC	-	Integrated Circuit
LED	-	Light Emitting Diode
TV	-	Television

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CHAPTER 1

INTRODUCTION

1.1 Project Background

The telecommunication technology nowadays is growing very fast. New invention of transmission systems has been developed to cater for high-speed data communication. However, for some countries, many nature disasters have taken place frequently. This lead to destruction of many telecommunication properties where it does disabled the new telecommunication systems. The telecommunication systems that we use nowadays are very dependant of installation like trunk cables, transmission line pylons and transmitter towers. This has make the system broke down and no service is available when massive disaster strikes.

A disaster is hard to be predicted and be prepared for. As for backup communication, Morse Code transmission modes using radio waves has been continued to be used when all other communication is not possible. The key of the reliability of Morse is its simplicity and dependability. The On-Off keying it implemented has made it the most reliable mode. However, only a few people understand the sound of short beep and long beep used in Morse Code. This will be a problem when a Morse Code message to be received in event of disaster.

The aim of this project is to help people to get the message in the Morse code signal. The input of the system will be a Morse Code sound (beeps and spaces). The use of PIC will be implemented in the system to make it small, light and mobile.

1.2 Problem Statement

A Morse Code operator need to listen to the beep of the received signal to get information from it. They have to distinguish the timing of each beep that will eventually form a letter or a number from a group of characters. For a competent Morse Code operator, the sound of dit (short beep) and dah (long beep) can be directly translated into messages by using their ears. However, it took a lot of practice to master the receiving skill and memorize all the codes. A long message can be a problem to the receiving party to translate. A piece of paper and pen may help them to record the received messages. However, it takes a lot of time and effort to do so and it is not practical.

Nowadays, the Morse Code is a rarely used and not many person can do the translation. However, as a backup communication system, somebody has to be able translate the Morse Code. I came up with this project to help user to discern information directly from the sound of Morse Code.

An operator must learn how to translate a series of dots and dashes into messages. Among difficulties faced by Morse Code operator was to remember codes. It also requires a lot of effort and time to discern information from codes. Furthermore, data lost may result from mistranslated or untranslated codes as human errors always happened while translating Morse Code. After a quick study, it has been discovered that the code translator using computer software has already being used. However, it is bulky & costly because we need to use computer to use it. It also consumes more power.

1.3 Project Objectives

In this project, the main goal is to develop a system capable of translating Morse code sound to text. PIC Microcontroller will be used in the system. It will add the value to this design because it is lightweight, small and use little power. The most suitable technique to translate Morse Code will be investigated and implemented in the system.

1.4 Scope of works

The scope of works for this project including:

i. Undergoing further study and understanding the communication using Morse Code.
ii. Studying and experimenting the technique to translate Morse Code.
iii. Designing the system using PIC using suitable methods.

1.5 Thesis Outline

In this part, the summary or overview for each chapter is discussed. The introduction of this project is outlined in Chapter I where it contains problem statement, objectives of the project and project scope methodology. Literature research and review is discussed in Chapter II such as basics of Morse code and PIC Microcontroller . Chapter III discuss the methodology and process involved in the project. The flowchart showing the flow of this project is outlined here to show step by step plan to achieve the goal of this project. Result and discussion of the project is covered in chapter IV. All the findings and result analysis is discussed in this chapter. Finally, in chapter V the conclusion for the project is made and few enhancements is suggested for further improvements the system itself.

CHAPTER 2

THE MORSE CODE & PIC MICROCONTROLLER

2.1 Introduction

In this chapter, various aspects related to the study of the proposed project will be discussed. Past projects and thesis which were related to the proposed project would be referred. Besides that, this chapter will show the actual concept of Morse Code communication and the various related aspect. The study on PIC microcontroller also will be included as well.

Morse code was invented by an American, Samuel Morse (179 1-1872). Before the invention of the telegraph, messages that had to be sent over long distances were usually carried by messenger. These messages were delivered only using the fastest available horse could travel.

In 1830, the first long distance telegraphic device was made by Joseph Henry (1797- 1878) and Samuel Morse invented a telegraph system for sending messages using electricity. Messages were sent by tapping out a special code for each letter in the form of long or short signals. We will refer to them as ‘dots’ (short signals) and ‘dashes’ (long) although they were originally called ‘dits’ and ‘dahs’. The code was converted into electrical impulses and sent over telegraph wires.

Figure 2.1 First wired telegraph [6]

In 1844, Morse demonstrated the telegraph to the US Congress using the message, "What hath God wrought" a quotation from the Bible.

In 1851, an international conference in Berlin established an international version which is still in use today. We are probably familiar with the SOS that is used as distress message which is shown below.

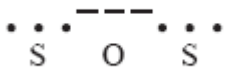

Figure 2.2 SOS Message [6]

2.2 On-Off Keying

Morse code is transmitted using a mode called On-Off keying. The on-off means that the carrier is present at “ON” state while it vanished at “OFF” state. An example for a transmitted wave for letter “K” is as shown below.

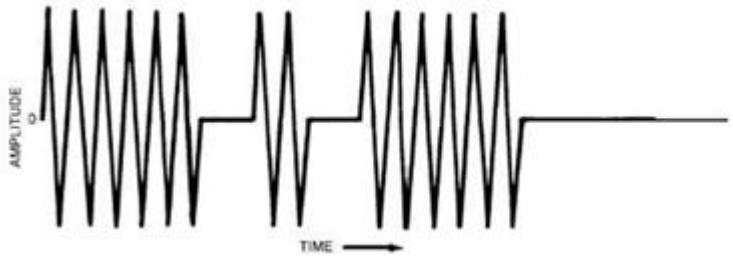

Figure 2.3 Carrier waveform [6]

To decode messages that contained in the wave, the user have to assume the waveform as digital form.

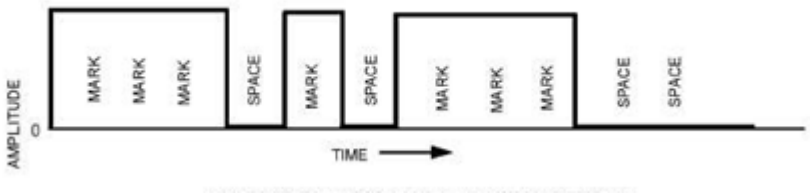

Figure 2.4 Digital form [6]