A REAL TIME BARCODE READER FOR LABORATORY ATTENDANCE (HARDWARE)

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Dedicated to:

To all my family, supervisor and my friends giving me unconditional love caring and support

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ABSTRACT

This project proposed a real-time barcode reader system for laboratory attendance barcode scanner, LCD display, microcontroller is used, and the interface circuit. Meanwhile the usages of microcontroller increase the efficiency in circuit serial programming. The purpose of this project is design a mobile barcode scanner, which it can save data in Microcontroller PIC16F877A and monitor using LCD module interface. The project consists of the combination of hardware such as barcode scanner, Microcontroller PIC16F877A and LCD module to produce system that have input and output signal. The barcode scanner is device that transmits data to a microcontroller and the result will show up instantly to the LCD by using serial communication. An analogue signal is triggered and processed through an analogue to digital converter circuit in which a Microcontroller PIC16F877A is used and then the data will be transported to a LCD. This project also used the Proteus Isis 6 Professional and the MPLab IDE as a compiler for the Microcontroller PIC16F877A. This project can be commercialized because it is cheap to built, easy to use, portable and also the program is easy to use.

ABSTRAK

Projek cadangan ini adalah sistem masa nyata bagi pengimbas kod bar untuk kehadiran makmal pelajar dengan mengunakan perkakasan seperti pengimbas kod bar, paparan LCD, pengawalmikro PIC dan litar penyambung dua alat. Sebagaimana di ketahui, penggunaan pengawalmikro dapat meningkatkan kecekapan dalam litar sesiri. Tujuan utama projek ini ialah bagi mencipta alat pengimbasmikro mobil yang mana dapat menyimpan data di dalam pengawalmikro PIC16F877A dan di paparkan pada alat antara muka iaitu LCD modul. Projek ini melibatkan gabungan antara perkakasan seperti pengimbas kod bar, pemgawalmikro PIC16F877A dan LCD modul yang mana antaranya dapat menghasilkan isyarat masukan (input) dan output (keluaran). Pengimbas kod bar adalah suatu alat yang boleh menghantar data kepada pengawalmikro dan keputusan akan di tunjukkan serta merta pada paparan LCD dengan menggunakan sambungan sesiri. Isyarat analog di cetuskan dan di proses melalui litar pertukaran analog ke digital yang mana pengawalmikro PIC16F877A di gunakan dan data akan di hantar terus ke paparan LCD. Projek ini juga mengunakan Proteus Isis 6 Professional dan MPLab IDE bagi proses mengkompil program untuk microcontroller PIC16F877A. Projek ini boleh di komersialkan kerana ia lebih murah untuk di buat, senang di gunakan, dan juga program yang mengendalikan adalah senang untuk di gunakan.

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LIST OF ABBREVIATION

PIC	Peripheral Interface Controller
ADC	Analogue to Digital Converter
TTL	Transistor Transistor Level
V	Voltage
VCC	Supply Voltage
VDD	Supply Voltage
VI	Input Voltage
VIN	Input Voltage
Vo	Output Voltage
VOUT	Output Voltage
VSS	Ground
GND	Ground
XTAL	Crystal Frequency
Ω	Ohms
UART	Universal Asynchronous Receiver
USART	Universal Synchronous Asynchronous
SPBRG	Serial Port Baud-Rate Generator
RS232	Standard 9-pin PC serial port

CHAPTER I

INTRODUCTION

1.1 BACKGROUND PROJECT

From the local convenience store to grocery and hardware stores, barcode scanners are used in almost every store for purchasing and inventory. Today's technology calls for sophisticated means of capturing the barcode and processing the data. Barcode data-collection systems provide enormous benefits for just about any business not only data collection is faster and more accurate, but costs are lower, mistakes are minimized, and managing inventory is very simple.

1.2 PROJECT OBJECTIVES

The objectives of the project are:

- To design a real time barcode reader for laboratory attendance, which it can save data by using a microcontroller PIC16F877A and monitor using LCD module interface.
- To develop and design a circuit which consists of the combination of hardware such as barcode scanner, microcontroller PIC16F877A and LCD module to produce a system that have input and output signal.
- To complete the function of barcode scanner for completing the circuit
- To understand the function of Microcontroller as a controller.
- To understand the function of LCD Display as a data presented.

1.3 SCOPE OF THE PROJECT

This real time barcode reader for laboratory attendance is a combination of hardware and software. Both are very important to determine whether the system can function properly and as desired. Below are the scopes of work for hardware used in this project:

1. RS232 is an asynchronous serial communications protocol
2. PIC16F877A circuit for microcontroller
3. LCD display module

1.4 PROBLEM STATEMENTS

Most of the recent electronic product is using high voltage and complex devices. Normally, computer is used as the display device as the display device to display the data taken from a barcode.

The problem occurs because of the used of computer that need high voltage to be operated and not portable. Therefore, the used of PIC Microcontroller as interface between LCD modules can be used to solve the problem. As mention before, the LCD Microcontroller is using low voltage and portable.

1.5 REPORT ORGANIZATION

This thesis consists of five chapters what describes in detail and clearly about this project. They are:

1) Introduction
2) Literature Review
3) Project Methodology
4) Result and Analysis
5) Conclusion

Chapter one is an introduction of the entire of the project. They are including with importance of this project and motivation of the projects. Besides, the introduction, problem statement, objective and scope of project are discussed in this chapter.

Chapter two will discuss the study and all the information that are related to this project. Rest of the chapter will discuss the literature review about this project. In the literature review, it includes research RSS232, LCD Display, and PIC microcontroller. In this chapter the theory and concept that is relevant and will be use in doing the project is shown in detail.

Chapter three will be explaining the methodology of implemented in this project in detail. In this chapter, the methods and the project flow has been explained in clearly.

The results and analysis are obtained on this project are given in chapter four. In this chapter, the progress of the project is explained. This chapter will include theoretical findings, conceptual designs and simulation results.

Last chapter in this thesis, which conclude the project and some suggestion are given.

CHAPTER II

BACKGROUND & LITERATURE REVIEW

2.1 THE HISTORY OF BARCODES

While it may seem like barcodes have been with us forever, barcodes didn't really make an impact until the 1970's. It wasn't until 1974 that the first barcode scanner was employed and the first product bar coded.

But the idea had been around for quite awhile. In 1932, Wallace Flint suggested that an automated retail checkout system might be feasible. While his concept was deemed unworkable, Flint continued to support the idea of automated checkout throughout his career. In fact, Flint, who went on to become the vice-president of the association of food chains some 40 years later, was instrumental in the development of the UPC code.

During the 40's, 50's and 60's several code formats were developed including a bull's-eye code, numeral codes, and various other formats. Retail applications drove the early technological developments of bar coding, but industrial applications soon followed.

2.1.1 First Commercial Use

Bar coding was first used commercially in 1966, but to make the system acceptable to the industry as a whole there would have to be some sort of industry standard. By 1970, Logicon Inc. had developed the Universal Grocery Products Identification Code (UGPIC). The first company to produce barcode equipment for retail trade using (using UGPIC) was the American company Monarch Marking (1970), and for industrial use, the British company Plessey Telecommunications (1970).

In 1972, a Kroger store in Cincinnati began using a bull's-eye code. During that same timeframe, a committee was formed within the grocery industry to select a standard code to be used in the industry. IBM proposed a design, based upon the UGPIC work and similar to today's UPC code. On April 3, 1973, the committee selected the UPC symbol (based on the IBM proposal) as the industry standard. The success of the system since then has spurred on the development of other coding systems. George J. Laurer is considered the inventor of U.P.C. or Uniform Product Code.

2.2 THE TECHNOLOGY OF THE BARCODE

A linear bar code is binary code (1s and 0s). The lines and spaces are of varying thicknesses and printed in different combinations. To be scanned, there must be accurate printing and adequate contrast between the bars and spaces. Scanners employ various technologies to read the codes. The two most common are lasers and cameras. Scanners may be fixed position, like most supermarket checkout scanners, or hand-held devices, often used for the taking of inventories.

Although it had very slow development in the beginning, the bar code has become a remarkable success, a workhorse in many and varied applications. One of the first successful bar codes, code 39 developed by Dr. David Allais, is widely used in logistical and defense applications. Code 39 is still in use today although it is less sophisticated than some of the newer bar codes.

Today, bar codes are everywhere. Rental car companies keep track of their fleet by means of bar codes on the car bumper. Airlines track passenger luggage, reducing the chance of loss. Researchers have placed tiny bar codes on individual bees to track the insects' mating habits. NASA relies on bar codes to monitor the thousands of heat tiles that need to be replaced after every space shuttle trip, and the movement of nuclear waste is tracked with a bar-code inventory system. Barcodes even appear on humans. Fashion designers stamp bar codes on their models to help coordinate fashion shows.

2.3 BARCODE APPLICATIONS

Barcodes (and other machine readable tags like RFID) are used wherever physical objects need to be tagged with information that is to be processed by computers. Instead of typing strings of data into a terminal, the operator only has to display the code to a barcode reader.

The data contained in a barcode varies with the application. In the simplest case an identification number is used as an index in database where the complete information is kept. The EAN-13 and UPC codes commonly found on retail articles work this way.

In other cases the barcode holds the complete information itself, with no need for an external database. This led the development of barcode symbiosis that can express

more than decimal digits, raging from additionally encoding just the upper case alphabet to the complete ASCII character set and beyond.

2.4 BARCODE READER

There are currently four different types of barcode readers available. Each uses a slightly different technology for reading and decoding a barcode. There are pen type readers, laser scanners, CCD readers and camera-based readers.

2.4.1 Pen Type Readers and Laser Scanners

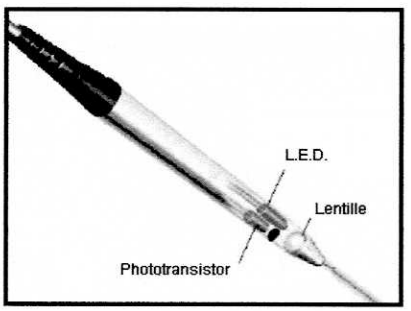

Figure 2.1: Example of pen type readers

Pen type readers consist of a light source and a photo diode that are placed next to each other in the tip of a pen or wand. By drag the tip of the pen across all the bars in a steady even motion, it means the code is read. The photo diode measures the intensity of the light reflected back from the light source and generates a waveform that is used to measure the widths of the bars and spaces in the bar code. Dark bars in the bar code absorb light and white spaces reflect light so that the voltage waveform generated by the photo diode is an exact duplicate of the bar and space pattern in the bar code. This