LCD DISPLAY OF LAB STATUS

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

Faculty of Electronic 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 : **LCD Display Of Lab Status**

Sesi Pengajian : 2008/2009

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Date : .....

Dedicated to my beloved family especially my father and mother, lecturer, and also to all my friends

ACKNOWLEDGEMENT

I would like to take this opportunity to thank my supervisor En Zulhairi Bin Othman , who assist and guide me a lot in executing my project and also some of the lecturer that give opinion and advice on my final project. I would also like to thank all my family members and course mates for their valuable opinion and moral supports.

ABSTRACT

This project is about designing a LCD display to display the status of the lab status, and the LCD module will be mount on the lab window or wall .The project is created to avoid class being disturb by creating a LCD display to show a message to the user want to display. It can be done by display the numeric, alphanumeric like "Lab in Progress" or Lab not in use" on the LCD activate by a push button. Not just that it also must interface to the security lock and display the status of acceptance of the lock. It can also display in LED indicate the lab status and password status. This is done by interface the LCD and 16F877A to display the password status ("Password accept" or Password reject") of the digital lock on the LCD and control the magnetic lock using PIC 16F877A which use as a security system. Then use of C language to control the whole system which is loaded to the PIC 16F877A microcontroller. Lastly the design of circuit must be user friendly that can be reprogrammed without taking out the microcontroller PIC16F877A and it done by create a ISP (in circuit programmer) to the system. The advantages of this project is cheaper compare to the commercially available product and it is useful and can be use in any office, home, store, lab and etc. And lastly overcome the disadvantages of the normal security door lock which does not working during power failure.

ABSTRAK

Project ini direka untuk memaparkan perkataan untuk menunjukkan status lab, module tersebut akan diikatkan pada tingkap lab atau dinding. Dimana fungsi projek ini adalah untuk mengelakkan gangguan orang ketika lab dengan mengunakan suis tekan sebagai masukkan kepada mikropengawal untuk menukarkan status yang dipaparkan pada paparan LCD iaitu paparan akan menunjukkan “lab in Progress” atau “lab not is use”apabila suis ditekan. Bukan sahaja itu, projek ini menpunyai fungsi sampingan sebagai pengunci sekuriti yang di kombinasi dengan paparan LCD untuk menunjukkan status kata kunci .Program yang menggunakan bahasa “C language” yang diggunakan untuk mengawal keseluruhan sistem.. Bukan sahaja itu objektif lain adalah menghasilkan system yang it boleh diprogram semula tanpa mengeluarkan mikropengawal daripada litar yang biasanya dipanggil “program circuit dalaman”. Kelebihan projek ini adalah ia adalah murah dan boeh diggunakan untuk pejabat, kilang, makmal adan sebagainya Bukan sahaja itu, projek ini mempunyai bekalan kuasa “backup” bagi mengelakkan system security masih berfungsi dalam masa bekalan elekrik tiada.

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CHAPTER 1

INTRODUCTION

The LCD display has become popular to display all types of text message to the user. Text can be easily displayed out to the LCD display by using microcontroller. LCD is more practical than the traditional type of the LED board where uses in clinic to show whether the doctor are on duty of off duty. For this project, it shows the status of the lab or class whether the lab or class is occupied before he/she opens the lab door and disturbs the session inside. The project aims to design and implement the LCD display to indicate the lab status. The LCD display is mounted on the lab window and controlled by a microcontroller with pre-settable status switches. A user can select appropriate lab status such as “lab in Progress” or “lab not in session” by selection the input on the push button whether the user wanted to have the LCD display “lab in Session” or “not in session”. The pre-settable status as displayed can be reprogrammed to change and modify the display message and text. It can also be used in other application for example in clinic, office and also home.

In addition there is another function of the design which have the security lock which can use as a protective system which lock the using magnetic lock. The LCD also shows the status of password which is either “Password accept” or “password reject” on the screen. It also has battery backup to avoid security breakdown during power failure and the problem of lost of key can be solve by this time can be save.

1.1 PROBLEM STATEMENTS

The project is created to avoid class disturbing by creating a LCD display to show a message or the information that the user want to display. Not just that it also must interface to the security lock and display the status of acceptance of the lock. It can also display in LED indicate the lab status and password status. Lastly the design of circuit must be user friendly that can be reprogrammed without taking out the microcontroller PIC16F877A ("in circuit programmer")

1.2 OBJECTIVES

The main goal of this project is to allow us to implement and design a LCD display control by microcontroller (Microchip) in the software and the hardware which is the objective:

- To display the numeric, alphanumeric on the LCD to the user to show any message or data to the user which is to overcome the lab/class interruption (message show on LCD "Lab in Progress" or Lab not in use")
- To display the password status ("Password accept" or Password reject") of the digital lock on the LCD and control the magnetic lock using PIC 16F877A
- to design a microcontroller that can be programmed and reprogrammed (ICP) In Circuit Programmer to change the display of the LCD.

1.3 SCOPE OF PROJECT

The scope of work in this project is stated as given:

1) Using 2 LINE X 16 CHARACTER LCD display
2) Using the PIC 16F877A to control the circuit
3) Display “Lab in Progress” and also “Lab Not in Use” on the LCD by programming the PIC16F877A
4) Display “Password accept” when the password is correct and also “password reject” when the password is wrong on the LCD
5) Make the circuit user friendly so that other user could easily program by using serial input which is common input for the PC or personal computer to programmed and reprogrammed data using WIN PIC Program to programmed the data (hex file) that have been executed by the PIC C Compiler that uses the high level language

1.4 SUMMARY OF METHODOLOGY

Project Sarjana Muda 2

This section describe the approach of the project that are used. Where from the first step of the project that is Then from the information that are understand create a flow step of the project where it can be use as a guide line. Therefore Where is start from the problem statement as in Project Sarjana Muda 1 understand the problem statement and objective of the project. After that the designing of circuit which is according to the specification of the hardware or component that are chosen. The specification is taken form the data sheet of the component. Then program is written using C language then compile to hex file before it is stimulate on the Protues Professional Software to stimulate the design. The circuit is develop and load to the hardware and test the functionality.

1.5 IMPORTANTS AND BENEFIT OF THE PROJECT

Student

- Able to implement and design a LCD display in the software and the hardware
- Able to show and design a product that are more cost effective by using program to replace the hardware
- Discipline and project management can be learn during the project

User

- Use to display the numeric, alphanumeric to the user to show any message or data to the user to avoid the disturbance of lab.
- It can be use in class, office and shop to display any message for example " OFFICE OPEN" or OFFICE CLOSE".
- Clinic can also use this device to show that " Dr Rajoo In Duty" or "Dr Lee in Duty"
- Can be use as electronic door lock which can be use to lock the door without using conventional key
- The electronic door lock have a advantage which it still can function during power failure which last for half an hour

CHAPTER 2

LITERATURE REVIEW

2.1 BACKGROUND STUDY

The hardware and software of the related is studied where the characteristic of the LCD and also the characteristic and function of the PIC16F877A is study and the see the type of LCD that are suitable for the project that going to be use later. And also the microcontroller that are more suitable for the project. Design the circuit according to the specification have been stated for each component. Then by using certain software to stimulate the circuit after familiar with the software needed.

2.2 REVIEW OF PREVIOUS STUDIES

2.2.1 Example 1 (AT Keyboard Interface)

This implementation contains the complete fetch and decoding of AT keyboard scan patterns as well as RS232 transmission of ASCII characters to the RS232 target device. It also features an interface to a dot matrix LCD display to visualize the characters typed on the locally attached keyboard.

Figure 2.0

A recent picture of my workplace connecting a Microsoft PS/2 AT keyboard to the PIC16F84.

An elderly picture of my workplace, at which the initial development took place.

2.2.2 How it works

Any key stroke on the local keyboard will send the corresponding scan patterns from the keyboard to the PIC microcontroller. Afterwards, the microcontroller converts the keyboard scan patterns to ASCII characters, shows them on the LCD display and transmits them to the RS232 target device.The keyboard scan code capture is done by an interrupt service routine. The event, which triggers the interrupt is a falling edge on the keyboard clock line (PORTB,0). Keyboard scan pattern acquisition takes place at the keyboard data line (PORTA,4). After 11 clocks (i.e. 11 external interrupts on RB0/INT), the interrupt service routine has completely captured an 8 bit element of the entire scan pattern and sets a ready flag. The decoding of this 8 bit element is then carried out during normal operation mode, activated by a valid ready flag whilst keeping the keyboard stalled (keyboard clock line low).

The fact, that the scan pattern acquisition is carried out using an interrupt service routine and the decoding thereof is done during normal operation mode allows for performing other tasks concurrently: That's why I call the acquisition routine *preemptive*. It does not block the processor while acquiring data.
Only RS232 transmission is supported by this program, since PORTB,0 interrupt is already used by the keyboard clock line. There exists no possibility to implement also RS232 reception using my modules m_rsxxx.asm, because they require PORTB,0 as well and are laid out as non-preemptive data acquisition routines (see also 'Limitations').
For dedicated code adaptations, please refer to the section 'User-specific Customization' below.
If you don't know the theory of AT keyboards, have a look at my short introduction or at Craig Peacocks tutorial about Interfacing the PC's Keyboard.

Specifications

Processor:	Microchip PIC16F84
Clock Frequency:	4 MHz crystal
Throughput:	1 MIPS
RS232 Baud Rate:	9600 baud, 8 bit, no parity, 1 stopbit
Code Size of entire	984 instruction words

Keyboard Routine Features:	Capability of bi-directional communication between microcontroller and keyboard
Acquisition Methodology:	Preemptive, interrupt-based keyboard scan pattern acquisition, decoding to ASCII characters during normal operation mode activated by ready flag
Required Hardware:	AT keyboard, PS/2 connector, MAX232, HD44780 compatible dot matrix LCD (2x16, 2x20 or 2x40 characters)
Required Software:	RS232 terminal software (or Excel 97 RS232 Debug Interface)

2.3 Example 2

LCD thermometer

figure 2.1

At this thermometer, the IC thermo sensor (S8100) or the diode (1S1588) is used as the thermo sensor. When using the IC thermo sensor, the thermometry to +100°C from -40°C is possible. Also, when using the diode, the measurement to +150°C from -20°C is possible. Both sensors are contained in the kit.This time, I used the diode as the thermo sensor to measure more than +100°C.ICL7136 of Intersil (Harris) is used for the thermometer and is measuring the change of the forward direction minute voltages of the diode by the temperature. The 3-1/2 digits liquid crystal display (SP521PR) is used for the display. The most significant digit can display only "1".

The consumption electric power of ICL7136 is very small and it is possible to operate about 3 months continuously with the 9-V cell.

The main parts are contained in the kit. The plastic case and the cell are contained. But, there is not a connection cable of the sensor.