AUTOMATIC HANDWASH SYSTEM USING MICROCONTROLLER

SOPHYA LIYANA BINTI MOHD YUSOP

This report is Submitted in Partial Fulfillment Of Requirement for The Bachelor of Electronic Engineering (Industrial Electronic)

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2010

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : AUTOMATIC HANDWASH SYSTEM USING MICROCONTROLLER

Sesi Pengajian : 09/10

Saya SOPHYA LIYANA BT MOHD YUSOP
*mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-*syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (√) :

☐	**SULIT***	*(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD****	**(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	**TIDAK TERHAD**	

Disahkan oleh:

(TANDATANGAN PENULIS)

Alamat Tetap: 698-3 Kg. Pulau Tempurung,
24000 Kemaman,
Terengganu.

Tarikh: 30 APRIL 2010

(COP DAN TANDATANGAN PENYELIA)

NURMALA IRDAWATY BT HASSAN
Pensyarah
Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Karung Berkunci No 1752
Pejabat Pos Durian Tunggal
76109 Durian Tunggal, Melaka

Tarikh: 30 APRIL 2010

"I hereby declare that this report is result of my own effort except for quotes as cited in the references."

Signature : 

Name : SOPHYA LIYANA BT MOHD YUSOP

Date : 30 APRIL 2010

"I hereby declare that I have read this report and in my opinion this report is sufficient in terms of scope and quality for the award of Bachelor of Electronic Engineering (Electronic Industrial) with Honours"

Signature : .....

Supervisor's Name : MDM NURMALA IRDAWATY BT HASSAN

Date : 30 APRIL 2010

NURMALA IRDAWATY BT HASSAN
Pensyarah
Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Karung Berkunci No 1752
Pejabat Pos Durian Tunggal
76109 Durian Tunggal, Melaka

To my beloved mom and dad

ACKNOWLEDGEMENTS

First and foremost, all Praise to Allah SWT the Almighty for giving me the Rahmah to finish my Project Sarjana Muda I successfully. I also would like to extend my appreciation to all those who contributed time, concern and effort to lend a helping allowing me to gain invaluable knowledge. On top of that, I would like to reserve a special thank to my supervisor, Miss Nurmala Irdawaty Bt Hassan for all her comments, constructive criticism and suggestion were taken seriously to make me understand the world of engineering. Their supports have leaded me to practice and learn more and more from them in order to finish my Project Sarjana Muda I.

I would like to thank my family, especially my loving parents Mohd Yusop Bin Ali and Maryati Bt Ermin. Thank you for the support and encouragement. They are always advising me to perform the best in my field that I involved. Not to forget to all my siblings, I love you all.

I also would like to thank to my beloved fiancée Rudi Iskandar Bin Hariyanto for his encouragement and always gave insightful comments on my works. Thank you very much for his endless support and ideas.

Finally, to everybody that has been involved in my project directly or indirectly, thank you very much.

ABSTRACT

This project is to build and to test an automatic hand wash system. The automatic hand wash system is more advanced than the conventional hand wash and it is designed to improve life by having a more convenient hand wash system. For instance, the water, soap and dryer are integrated all into the system. The machine controls the water, soap and dryer automatically in sequence using the PIC16F877A microcontroller. Water, soap and dryer are controlled based on the programming code that programmed in the PIC16F877A microcontroller. The project is using the infrared sensor to detect the user hand. The level of soap can be detected by sensor. First, the soap sensor detects the level of soap, if the level of soap low, the red lamp will ON and the operation cannot operate. When the green lamp was ON, that means the level of soap is full and the operation can operate. Then if the infrared sensor (hand sensor) detects the user hand, the water flows to wash the hand for 10 seconds. After that, the soap will flow for two seconds and delay for eight seconds. After delay, the water flow out again for 10 seconds and dryer will activate depends on the user hand. If hand sensor cannot detect the user hand, the operation will end.

ABSTRAK

Projek ini bertujuan untuk menghasilkan satu sistem pembasuh tangan automatik. System ini lebih canggih dan maju daripada system basuh tangan biasa dan ia dicipta untuk memudahkan kehidupan manusia dengan menghasilkan satu sistem pembasuh tangan yang mesra pengguna dan mudah digunakan. Air, sabun dan pengering akan dipasang pada sistem ini. Mesin ini mengawal air, sabun dan pengering tangan secara automatik mengikut turutan yang ditetapkan dengan menggunakan mikro pengawalan PIC16F877A. Kawalan air, sabun dan pengering menggunakan mikro pengawalan PIC16F877A adalah berdasarkan kod aturcara program yang diprogramkan ke dalam mikro pengawalan PIC16F877A. Projek ini menggunakan pengesan infra merah untuk mengesan tangan pengguna. Paras sabun pula dikesan oleh pengesan. Pertama sekali, pengesan sabun mengesan paras sabun, jika paras sabun rendah, LED merah akan menyala dan operasi sistem tidak boleh diteruskan. Apabila LED hijau menyala, menunjukkan paras sabun adalah penuh, maka sistem ini boleh berfungsi. Selepas itu, pengesan infra merah mengesan tangan pengguna, air akan keluar selama sepuluh minit dan pengguna boleh basuh tangan. Selepas itu, sabun akan keluar selama 2 saat dan sistem akan berhenti selama 8 saat untuk member peluang pengguna untuk meratakan sabun ke seluruh tangan. Kemudian, air akan keluar semula selama 10 saat dan pengering tangan akan aktif untuk mengeringkan tangan pengguna. Jika pengesan infra merah tidak mengesan tangan pengguna lagi, maka operasi akan tamat.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

PIC	-	Perhipheral Interface Controller
RAM	-	Random Access Memory
LED	-	Light Emitting Diode

LIST OF APPENDIX

CHAPTER I

INTRODUCTION

This chapter is focusing on the introduction of the project, project objectives, problem statements, scope of work, system operation (methodology) and organisation of thesis.

1.1 Introduction

This project is to build and to test an automatic hand wash system. The automatic hand wash system is more advanced than the conventional hand wash and it is designed to improve life by having a more convenient hand wash system. For instance, the water, soap and dryer are integrated all into the system. The machine controls the water, soap and dryer automatically in sequence using the PIC16F877A microcontroller.

1.2 Project Objectives

These are the main purposes of this project:

(a) Prevent the risk of having contact with micro-bacteria after washing hand as this system helps to wash hand individually. Hence, it is more efficient and more hygienic.

(b) To improve life by providing more convenient and easier way as the user just need to place his/her hand to wash hands and does not need to turn on the water tap.

1.3 Problem Statement

The automatic handwash system will help to wash a person's hand and in addition would save time. The automatic handwash system is actually a smart system as the people who wish to wash his/her hand don't need to turn on the water pipe.

1.4 Scope of Work

This project is automatic handwash system by using microcontroller (8051). The function of the project is to improve people's life by having a more convenient hand wash system. This machine have three outputs, the outputs are water, soap and dryer to dry the hand. The machine also have two sensors, the sensor is Infrared sensor (Transmitter and Receiver) and the level soap sensor. Infrared sensor is to detect the user hand, if the sensors detect the hand, the operation of machine will operate. The outputs for this machine are put at the same place, where the hand sensor Infrared Transmitter is located. This machine have the sink to flow the water when wash the hand to the ditch.

To complete this project, the soap display is included when the level of soap low, the red lamp is ON, whereas when the level of soap full, the green lamp will ON.

1.5 Methodology

Proteus ISIS 6 Professional is used to design the circuit and simulate it. After completing the circuit assembly and configuration, its time to verify whether the source code compiled is virtually accurate or not. The source code is designed by using PICC Lite Compiler with MPLAB IDE which is widely used by most of the programmers where their project is related to PIC-based system or microcontroller. When the simulation successfully runs, this means that the circuit will be tested and troubleshooting may necessary taken to overcome those circuitry problems. After done without error, the circuit will be packaged and the users may ready to use.

1.6 Thesis Outline

This thesis is a document that delivers the ideas generated and the concept applied. It consists of 5 chapters which are Introduction, Literature Review and Methodology.

Chapter 1 is all about the introduction which contains background, project objectives, problems statements, scope of work and a simple methodology.

Chapter 2 explains about literature review regarding the project. It discusses the researches done upon the related project and data obtain through journals, books, magazines and internet.

Chapter 3 describes the methodology of the project which includes the project flow and its functional block diagram. It also discusses the methods used for the project such as software applied and reasons behind it.

Chapter 4 discusses about the result for this project.

Chapter 5 concluded about the whole project findings for this semester and the recommendation for future work.

CHAPTER II

LITERATURE REVIEW

This chapter is about literature review regarding the project. It discusses about the theory and software that are use in the project.

2.1 Microcontroller [1]

Microcontrollers can be found in any products these days. For example modern washing machine in our house that consists of timer, button and LED contains a microcontroller. All modern cars contain microcontroller. Digital electronics knowledge is essential in order to understand the way microcontroller works. However, with the existing of latest microcontroller like peripheral interface controller (PIC) PIC16F877A from microchip, microcontroller works by writing programming code using C language. Everything becomes so simple by learning C programming and uses it to program the microcontroller. Here are the examples of microcontrollers:

(a) PIC 16F870
(b) PIC 16F871
(c) PIC 16F872

(d) PIC 16F873A

(e) PIC 16F874A

(f) PIC 16F876A

(g) PIC 16877A

2.2 Microcontroller

A microcontroller is a small computer and it can only perform simple task. Microcontroller consists of:

(a) Processor that executes programs. Processor execute program digitally. All instruction given to the processor should be in digital form.

(b) Program Memory to store the program that has been compiled successfully by the programmer.

(c) RAM (random-access memory to store "variables").

(d) IO Port to connect sensor, keypad, LED, Relay and so on.

(e) Timer to count the time executes some process.

2.2.1 Microchip PIC 16F877A Microcontroller Features

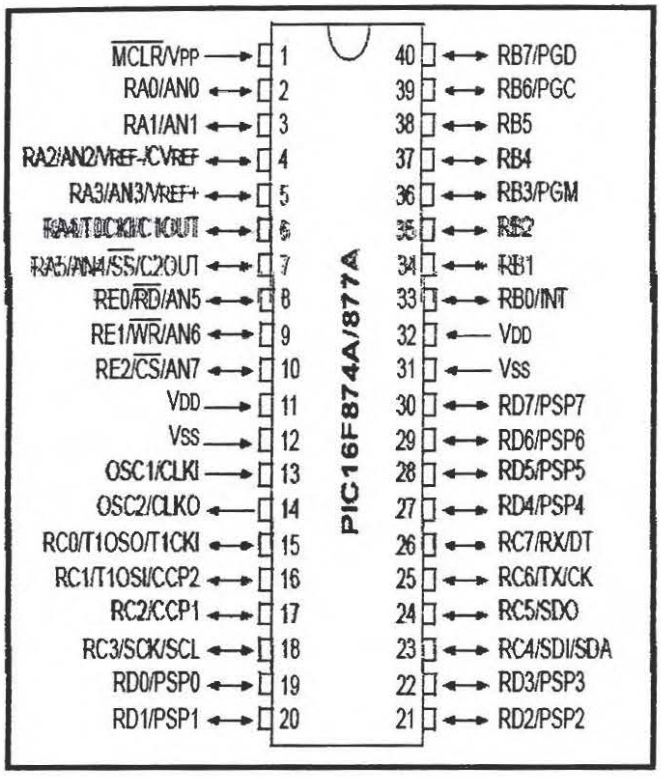

Figure 2.1: PIC 16F877A

High-Performance RISC CPU:

(a) Lead-free; RoHS-compliant

(b) Operating speed: 20 Mhz, 200 ns instruction cycle

(c) Operating voltage: 4.0 – 5.5 V

(d) Industrial temperature range (-40° to +85°C)

(e) 15 Interrupt Sources

(f) 35 single-word instructions

(g) All single-cycle instructions except for program branches (two-cycle)

Special Microcontroller Features:

(a) Flash Memory: 14.3 Kbytes (8192 words)
(b) Data SRAM: 368 bytes
(c) Data EEPROM: 256 bytes
(d) Self-reprogrammable under software control
(e) In-Circuit Serial Programming via two pins (5V)
(f) Watchdog Timer with on-chip RC oscillator
(g) Programmable code protection
(h) Power-saving Sleep mode
(i) Selectable oscillator options
(j) In-Circuit Debug via two pins

Peripheral Features:

(a) 33 I/O pins; 5 I/O ports
(b) Timer0: 8-bit timer/counter with prescaler
(c) Timer1: 16-bit timer/counter with prescaler
    i. Can be incremented during Sleep via external crystal/clock
(d) Timer2: 16-bit timer/counter with 8-bit period register, prescaler and postscaler
(e) Two Capture, Compare, PWM modules
    i. 16-bit Capture input; max resolution 12.5 ns
    ii. 16-bit Compare; max resolution 200 ns
    iii. 10-bit PWM
(f) Synchronous Serial Port with two modes:
    i. SPI Master
    ii. I2C Master and Slave
(g) USART/SCI with 9-bit address detection
(h) Parallel Slave Port (PSP)

i. 8 bits wide with external RD, WR and CS controls

(i) Brown-out detection circuitry for Brown-Out Reset

Analog Features:

(a) 10-bit, 8-channel A/D Converter

(b) Brown-Out Reset

(c) Analog Comparator module

i. 2 analog comparators

ii. Programmable on-chip voltage reference module

iii. Programmable input multiplexing from device inputs and internal VREF

iv. Comparator outputs are externally accessible