UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek	:	DEVELOP HARDWARE FOR AUTOMATIC BABY MILK MIXER
Sesi Pengajian	:	2006/2007

Saya ASMAH BINTI AHMAD

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: BT. 23 ¼, Ramuan China kecil,, 78100 Lubok China Kecil, Melaka

(COP DAN TANDATANGAN PENYELIA)

FAUZI B MOHD JOHAR
Pensyarah
Fakulti Kej Elektronik dan Kej Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 03/05/07

Tarikh: 03/05/07

© Universiti Teknikal Malaysia Melaka

"I admit that I have read this thesis and in my opinion, it is suitable in term of scope and quality for the purpose of awarding a Bachelor Degree in Electronic Engineering (Telecommunication Electronics)"

Signature:.....

Name: En. Fauzi bin Mohd. Johar

Date:... 03/05/07

© Universiti Teknikal Malaysia Melaka

DEVELOP HARDWARE FOR AUTOMATIC BABY MILK MIXER

ASMAH BINTI AHMAD

This Report Is Submitted in Partial Fulfillment Of requirements For the Bachelor Degree of Electronic Engineering (Telecommunication Electronics)

Faculty of Electronic and Computer Engineering
University Teknikal Malaysia Melaka

APRIL 2007

© Universiti Teknikal Malaysia Melaka

DECLARATION

"I hereby declare this thesis entitle, Develop Hardware for Automatic Baby Milk Mixer is a result of my own research idea except for work that I've been sited clearly in the references.

Signature:.....

Name: Asmah Binti Ahmad

Date:03/05/07

© Universiti Teknikal Malaysia Melaka

Dedicated to my beloved family especially my mother Pn. maznah Binti Saleh and my father En. Hasim bin. Salleh and my kindhearted supervisor Mr. Fauzi Bin Mohd Johar; and also to all my dearest friends.

© Universiti Teknikal Malaysia Melaka

ACKNOWLEDMENT

First of all, I would like to thanks to our Almighty God for giving me a chance to complete these thesis within this period.Thanks a lot to my supervisor, Mr. Fauzi Mohd. Johar who would spend a lot of his time to make sure this project is successfully done. Also to colleagues at Universiti Teknikal Malaysia Melaka and for those who contributed to this project. Without their support this project may not done and special thanks for those who's contributed to fulfill this project.Not forgotten to my beloved parent, I want to thanks them because they let me further my study in Universiti Teknikal Malaysia Melaka. Thanks to their support and effort to encourage me to finish this project successfully. Once again for those who contributed to fulfill this project,. "Thank you" and May God repay for all that have you all done to me. Thank you very much.

© Universiti Teknikal Malaysia Melaka

ABSTRACT

Mixing baby milk powder can be very tedious job. The automatic baby milk mixer is created to allow user to mix the milk powder with desired amount and manage their baby milk powder with ease. There are many product that has been made to simplified people lifestyle, so that there will be no more wasted of time. This product is develops to help user to have more quality time with their family. They no need to do the tedious job to prepared the baby formula milk step-by-step. With this product, it can make our life goes simple and easier each day. Just push one button and their preparation for baby formula milk is done. This mixer is design for picnic purpose so customers only bring one container which contains hot water, drinking water and baby milk powder. This mixer is easy to be place because the water and the milk powder inside it wouldn't spill out from the container. Since that the mixer is using the dc power supply so customer no need to find the 240Vac power supply. They can use rechargeable battery or bring together extra battery if they want to go for a long trip.

© Universiti Teknikal Malaysia Melaka

ABSTRAK

Kebiasaannya, kerja membancuh susu bayi amat remeh. Pembancuh susu automatic ini dicipta untuk memudahkan pengguna membancuh susu tepung mengikut kehendak mereka. Untuk menjimatkan masa agar kita tidak terkejar-kejar ke sana ke mari, pelbagai jenis produk telah direka untuk memudahkan kerja-kerja seharian kita. Produk ini dicipta supaya pengguna dapat meluangkan lebih benyak masa dengan keluarga mereka. Pengguna tidak perlu membancuh susu tepung sendiri. Dengan adanya produk terbaru ini kehidupan seharian menjadi lebih mudah dengan hanya menekan satu suis dan susu formula untuk bayi telah tersedia. Produk ini dicipta untuk tujuan memudahkan pengguna membancuh susu bayi semasa melakukan aktiviti seperti berkelah, jadi mereka cuma perlu membawa satu bekas yang mengandungi tiga bekas lain yang mengandungi air panas, air minuman dan susu tepung bayi. Produk ini juga mudah diletakkan di mana-mana sahaja walaupun di dalam kereta kerana air dan susu di dalamnya tidak akan terkeluar dari bekasnya. Produk ini menggunakan bateri 12V sebagai bekalan kuasa. Pengguna yang ingin membuat aktiviti luar yang lebih lama disarankan membawa bateri gentian atau menukarkan bateri yang sedia ada dengan yang baru.

© Universiti Teknikal Malaysia Melaka

CONTENTS

CHAPTER	TITLE		PAGE
	PROJECT TITLE		
	DECLARATION		ii
	DEDICATION		iii
	ACKNOWLEDGEMENT		iv
	ABSTRACT		v
	ABSTRAK		vi
	CONTENT		vii
	LIST OF TABLE		xi
	LIST OF FIGURE		xii
	LIST OF ABREVIATION		xv
	LIST OF APPENDIX		xvi
I	**INTRODUCTION**		
	1.1	**BACKGROUND OF PROJECT**	1
	1.2	**OBJECTIVES OF THE PROJECT**	2
	1.3	**PROBLEM STATEMENTS**	2
	1.4	**SCOPE OF WORK**	3
	1.5	**METHODOLOGY**	4
	1.6	**REPORT STRUCTURE**	4

© Universiti Teknikal Malaysia Melaka

II LITERATURE REVIEW

2.1	**INTRODUCTION**	5
2.2	**MOTOR**	5
	2.2.1 12V MOTOR	6
	2.2.2 DC MOTOR-DRIVER H-BRIDGE CIRCUIT	6
	2.2.3 STEPPER MOTOR DRIVER (74194)	10
	2.2.4 STEPPER MOTOR DRIVER OPERATION	11
	2.2.5 INTEGRATED CIRCUIT CHIPS USED	12
	2.2.6 STEPPER MOTOR DRIVER WAVEFORMS	14
	2.2.7 STEPPER MOTOR DRIVER EQUIVALENT	14
	2.2.8 74194 STEPPER MOTOR DRIVER	14
	2.2.9 STEPPER MOTOR DRIVER CIRCUIT INITIAL TESTING VERSION	20
2.3	**VALVES**	21
	2.3.1 240V VALVES	21
	2.3.2 SOLENOID VALVES	22
2.4	**THE 555 TIMER CIRCUIT**	23
	2.4.1 555 AND 556 TIMER CIRCUITS	24
	2.4.2 INPUT OF 555	25
	2.4.3 OUTPUT OF 555/556	26
	2.4.4 555 AND 556 ASTABLE	26

© Universiti Teknikal Malaysia Melaka

	2.4.5	CHOOSING R_1, R_2 AND C_1 FOR 555 ASTABLE	29
	2.4.6	ASTABLE OPERATION	30
	2.4.7	DUTY CYCLE	31
	2.4.8	555/556 MONOSTABLE	32
	2.4.9	MONOSTABLE OPERATION	34
	2.4.10	TRIGGER CIRCUIT	36
	2.4.11	BISTABLE	37
	2.4.12	55/556 INVERTING BUFFER (SCHMITT TRIGGER) OR NOT GATE	38
III	**METHODOLOGY**		
3.1	**FLOW CHART**		40
3.2	**BLOCK DIAGRAM**		42
3.3	**THE 555 TIMER CIRCUIT**		43
	3.3.1	CIRCUIT OPERATION	44
	3.3.2	TIMING ACCURACY	45
	3.3.3	TIMING CALCULATION	46
	3.3.4	PROCEDURE OF CONSTRUCTING THE CIRCUIT AT PCB BOARD	46
3.4	**THE 240V VALVE**		50
3.5	**THE 12V MOTOR**		51
IV	**RESULT AND DISCUSSION**		
4.1	**RESULT**		54

© Universiti Teknikal Malaysia Melaka

	4.2	DISCUSSION	59
V		CONCLUSION AND SUGGESTION	
	5.1	CONCLUSION	61
	5.2	SUGGESTION	62
		REFERENCE	63

© Universiti Teknikal Malaysia Melaka

LIST OF TABLE

NUMBER	TITLE	PAGE
2.1	Choosing R_1, R_2 and C_1 for 555 astable	29
3.1	Timing calculation of the 555 timer circuit.	46

© Universiti Teknikal Malaysia Melaka

LIST OF FIGURE

NUMBER	TITLE	PAGE
1.1	The flowchart showing the methodology of the project development.	4
2.1	12V Motor	6
2.2	DC Motor-Driver H-Bridge Circuit.	8
2.3	Added features such as an LP2954 5V voltage regulator, a bicolor LED, and two switches for testing.	10
2.4	Stepper Motor Driver Circuit.	11
2.5	The diagram shows the basic waveforms for the stepper motor driver circuit.	13
2.6	The diagram shows a very simplified diagram of the step function of the 74194 chip.	14
2.7	ULN2003 Motor Driver Stepping Order	15
2.8	Stepper Motor Driver Test Circuit	20
2.9	The valve application in mixer	22
2.10	The hand-made valve	23
2.11	The LM555 Timer	23
2.12:	An example of the circuit symbol and the actual pin arrangement for 555 timer	23

© Universiti Teknikal Malaysia Melaka

2.11	Output of 555 timers	26
2.12	The output of timer 555 or 556	28
2.13	555 Astable circuit	28
2.14	Astable operation	30
2.15	Duty cycle for astable circuit	31
2.16	555 astable circuit with diode across R_2	31
2.17	555 monostable output and circuit with manual trigger	32
2.18	Monostable Output Time graph for LM 555 timer chip	34
2.19	Monostable operation	35
2.20	Power Off Reset Trigger Circuit	36
2.21	Edge-trigger circuit	37
2.22	555 bistable circuit	38
2.23	555 inverting buffer circuit and not gate	38
3.1	Flow chart of the project	41
3.2	Block diagram of the system	42
3.3	The schematic diagram of 555 timer circuit.	43
3.4	Circuit diagram at PCB	44
3.5	The IC NE555 diagram	44
3.6	The 555 timer circuit that is used to control the valve and motor.	45
3.7	UV machine	47
3.8	Etching the PCB board in the etching machine	47
3.9	The complete PCB board	48
3.10	Drilling the component leg at the PCB board	48
3.11	Soldering the circuit	49
3.12	Testing the circuit	49
3.13	The 240V valve that is used for hot water and cold water container controller.	50

© Universiti Teknikal Malaysia Melaka

3.14	The connection between valve, relay, switch and 3-pin plug	51
3.15	The 12V motor that is used for milk powder container controller	51
3.16	The motor movement	52
3.17	The connection between relay, motor and dc power supply/ battery	52
3.18	The completed project	53
4.1	Schematic diagram of 555timer	55
4.2	PCB layout	56
4.3	The 555 timer circuit	56
4.4	The connection between valve, relay, switch and 3-pin plug	57
4.5	Troubleshooting the circuit with multimeter	58
4.6	The connection of the circuit	58
4.7	The connection between relay, motor and 12V power supply	59

© Universiti Teknikal Malaysia Melaka

LIST OF ABREVIATION

C	- Capacitor
IC	- Integrated circuit
L	- Life cable
N	- Neutral cable
PCB	- Printed Circuit Board
R	- Resistor
RLY	- Relay
VR	- Variable Resistor

© Universiti Teknikal Malaysia Melaka

LIST OF APPENDIX

NUMBER	TITLE	PAGE
A	Astable Oscillator	64
B	List of Component	65
C	List Of Material	66
D	LM555 Interlocked Monostable Timer	67
E	Other Motor Type	68
F	555 Timer Schematic Diagrams	72

© Universiti Teknikal Malaysia Melaka

CHAPTER I

INTRODUCTION

1.1 BACKGROUND OF PROJECT

The automatic baby milk mixer portably composed three different containers for hot water, drinking water and milk powder using the dry cell power or chargeable battery. This mixer is able to automatically mix for each for selected oz of baby milk powder by adjusting the variable resistor also known as the potentiometer.

The automatic baby milk mixer is developing by using the timer 555 circuit as a controller to control the output of the 12V motor and the 240V valve with contain a baby milk powder and the water. The milk powder and the water are flowing downward to the baby bottle which is situated under the milk powder and water container.

This automatically baby milk mixer will add the hot water and drinking water when the user switches on the power supply. Since that the motor and valve is controlled with different switch and the valve itself is controlled with different switch so the user can filled the baby bottle depend on the quantity of milk powder and water that there are desired. The timer is operating from five second to hundred second. User also can stop the timer depends on their desired amount.

© Universiti Teknikal Malaysia Melaka

1.2 OBJECTIVES OF THE PROJECT

i. To develop an automatic baby milk mixer that can mix the baby milk powder, hot water, and drinking water in one bottle.

ii. To produce the user's friendly system which customer can select the desired amount by switch on the switch of the milk powder, hot water and drinking water.

1.3 PROBLEM STATEMENTS

i. There are many product that has been made to simplified people lifestyle, so that there will be no more wasted of time.

ii. This product is develops to help user to have more quality time with their family.

iii. They no need to dirty their hand to prepared the baby formula milk step-by-step.

iv. With this technology, it worth to develop something that can make our life goes simple and easier each day.

v. Just push one button and their preparation for baby formula milk is done.

© Universiti Teknikal Malaysia Melaka

1.4 SCOPE OF WORK

i. To study about motor, valve and 555 timer circuit.

ii. Develop the hardware for automatic baby milk.

iii. Designed to mix the milk powder, cold water and hot water together according to the user's desire amount without messing their hand.

iv. Understanding the operation of the 12V motor, 240V valves and the 555 timer circuit.

v. Construct the circuit to control the mixer using the 555 timer circuit.

vi. Designed the hardware using the motor and valve to the container.

vii. Do the connection from the 555 timer circuit to the motor and valves.

© Universiti Teknikal Malaysia Melaka

1.5 METHODOLOGY

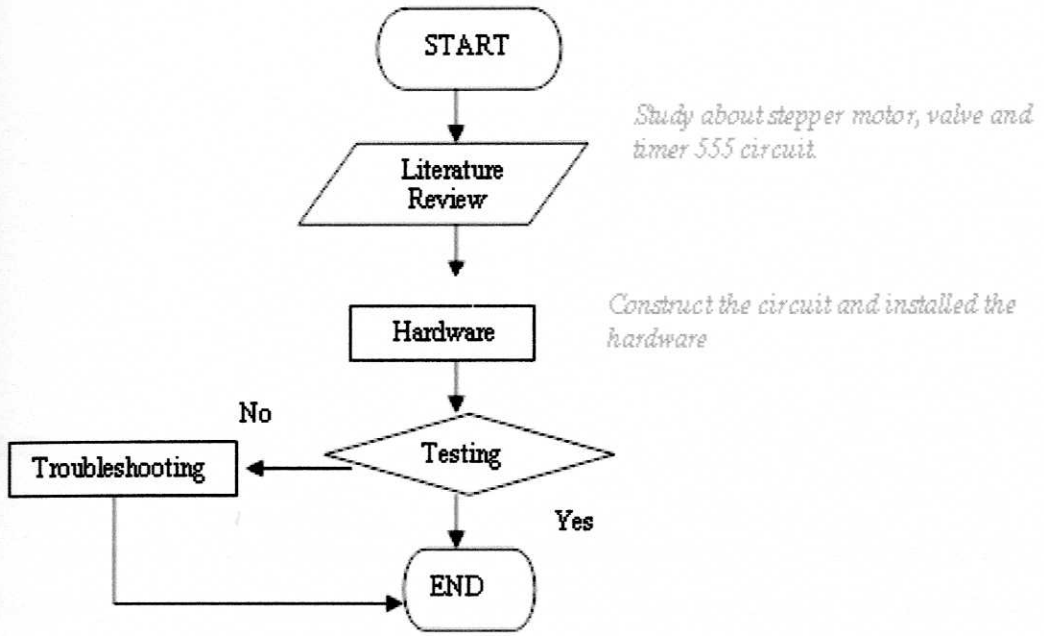

Figure 1: The flowchart showing the methodology of the project development.

1.6 REPORT STRUCTURE

The first chapter tells about the introduction of the project. It's including the overview of the project such as objective, problem statement, scopes of the project and a little about the methodology. At the second chapter, it discuss about the literature review regarding the project. Meanwhile the third chapter it explains more about the methodology of the project. Then the chapter four it focuses on the result and the analysis of the project. Finally, chapter five contained the discussion of the project also the conclusion of it.

© Universiti Teknikal Malaysia Melaka

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

To produce these develop this automatic baby milk mixer there are divided in three main part that is need to construct in order to make the mixer is operated. The main part is such as:

a. 12V Motor
b. 240V Valves
c. 555 timer circuit

Each of the part need to be compared with each other to analyzes the suitable one to be installed to the hardware. At least two or three item of each part is to be analyses to see whether it saving the budget and worth with the project.

2.2 MOTOR

For the hardware designs I've make a comparison among the motor that already exists in our market and from this comparison I've to choose the suitable motor to

© Universiti Teknikal Malaysia Melaka

design the mixer. Since the mixer must use the 12V power supply and it must be able to carry for picnic purposes. The motor is controlling the milk powder container and the output of the milk powder is determine by the 555 timer circuit.

2.2.1 12V MOTOR

The motors utilized in the juice mixer, is the DC motor and it can be operated using a 12Volts battery. A uniform 12V voltage source was used for all the motors. Although 12V is well below the optimal performance of the motors, it was selected. On top of that, they also limit the time the solenoids are turned on and not turning them on simultaneously.

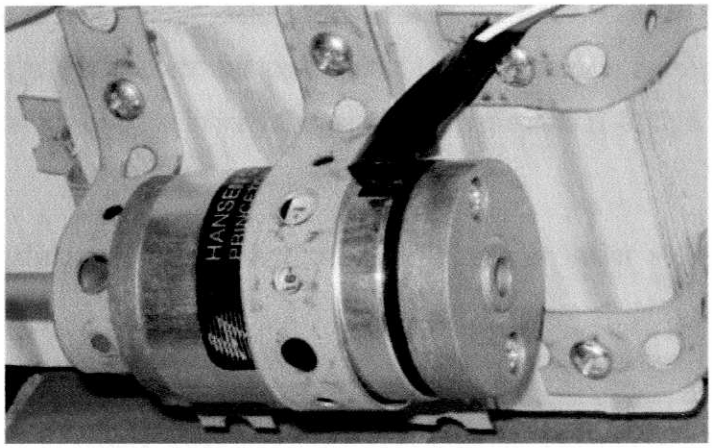

Figure 2.1: 12V Motor [6]

2.2.2 DC MOTOR-DRIVER H-BRIDGE CIRCUIT

It would be nice if a motor could be attached directly to a chip that controlled the movement. But, most chips can't pass enough current or voltage to spin a motor. Also, motors tend to be electrically noisy (spikes) and can slam power back into the control lines when the motor direction or speed is changed. Motor driver circuit have been developed to supply motors with power and to isolate the other ICs from electrical problems. These circuits can be designed such that they can be completely separate

© Universiti Teknikal Malaysia Melaka