# AIR-CONDITIONING CONTROL SYSTEM FOR ENERGY SAVING APPLICATION

#### MOHD SHAHRIZAD BIN AB HAMID

This thesis is submitted as partial fulfillment of the requirement for the award of the Bachelor Degree of Electrical Engineering (Control and Instrumentation)

> Faculty of Electrical & Electronics Engineering Universiti Malaysia Pahang

> > APRIL 2009

### TABLE OF CONTENTS

CHAPTER	TITLE	PAGE

TITI	LE PAGE	i
DEC	CLARATION	ii
DED	DICATION	iv
ACK	NOWLEDGEMENT	v
ABS	TRACT	vi
ABS	TRAK	vii
TAB	BLE OF CONTENTS	viii
LIST	Г OF TABLES	xi
LIST	<b>F OF FIGURES</b>	xii
LIST	LIST OF ABBREVIATIONS	
LIST	Γ OF APPENDICES	XV
INT	RODUCTION	
1.1	Overview	1
1.2	Objectives of Project	2
1.3	Scopes of Project	2
1.4	Thesis Outline	3
LITI	ERATURE REVIEW	
2.1	Introduction	4
2.2	A study on Antenna	4

1

2

2.3 Maneuver Properties 6

viii

2.4	Microcontroller PIC16F84A	7
2.5	Stepper Motor	13
2.6	Related Stepper Motor project	14

### **3** METHODOLOGY

3.1	Introduction	15
3.2	Project Development	15
3.9	Power Supply Interface Circuit	18
3.10	PIC Microcontroller Selection	23
3.11	PIC Microcontroller Interface Circuit	23
3.14	Software Development	24

### 4 **RESULT AND ANALYSIS**

4.1	Introduction	26
4.3	Power Supply Interface Circuit Analysis	27
4.4	Stepper Motor Controller Test Circuit	29
4.6	Circuit Analysis	30

### 5 CONCLUSION AND RECOMMENDATION

5.1	Conclus	sion	34
5.2	Difficul	lties	34
	5.2.1	Cost and Commercialization	35

REFERENCES	36

APPENDICES	
APPENDIX A	38
APPENDIX B	40

## LIST OF TABLES

TABLE	TITLE	PAGE
5.1	Cost for the controller board	56
5.2	Cost for Hardware Connection	57
5.3	Overall Cost of the Project	57

#### LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Parabolic Antenna	5
2.2	Azimuth And Elevation Angle	6
2.3	PIC16F84A Block Diagram	7
2.4	PIC16F84A Pin Diagram	9
2.5	PIC16F84A	9
2.6	PIC16F84A block Diagram	12
3.1	Project development flow chart	16
3.2	Block Diagram for whole system	17
3.3	Power supply interface circuit.	18
3.4	Filter waveform showing dc and ripple voltage	19
3.5	Ripple equation	19
3.6	Full wave voltage without capacitor filter	20
3.7	Filtered output voltage	21
3.8	Approximate output voltage of capacitor filter circuit	22
3.9	PIC 16F84 microcontroller interface circuit	23
3.10	The process of communication between a man and a	24
	microcontroller	
4.1	Power Supply Interface Circuit	27
4.2	Output Waveform of LM7805 using Oscilloscope	28
4.3	Stepper motor controller circuit	29
4.4	Oscillator circuit	30
4.5	Hardware design for circuit	31
4.6	Modeling (outside view)	32

## LIST OF ABBREVIATIONS

PIC	Programmable Interface Controller
MHz	Mega Hertz
IC	Integrated Circuit
VDC	Volt Direct Current
AC	Alternate Current
GUI	Graphical User Interface
kWh	Kilo Watts per Hour
PC	Personal Computer
LED	Light Emitting Diode

#### LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A1	Hardware of Antenna Movement Controller	39
В	Datasheet	40