

UNIVERSITI MALAYSIA PAHANG

BORANG PENGESAHAN STATUS TESIS*

JUDUL: **TEMPERATURE CONTROLLED NiCd BATTERY CHARGER**

SESI PENGAJIAN: **2007/2008**

Saya **HAZER BIN MOHAMAD SAYUTI (860719-29-5517)**
(HURUF BESAR)

mengaku membenarkan tesis (Sarjana Muda/Sarjana /Doktor Falsafah)* ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Tesis adalah hak milik Universiti Malaysia Pahang (UMP).
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan tesis 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)

(TANDATANGAN PENYELIA)

Alamat Tetap:

NO 95 BLOK PASIR PUTEH
17700 AYER LANAS
KELANTAN

RUHAIZAD BIN ISHAK
(Nama Penyelia)

Tarikh: **17 NOVEMBER 2008**

Tarikh: : **17 NOVEMBER 2008**

- CATATAN: * Potong yang tidak berkenaan.
 ** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali tempoh tesis ini perlu dikelaskan sebagai atau TERHAD.
- ◆ Tesis dimaksudkan sebagai tesis bagi Ijazah doktor Falsafah dan Sarjana secara Penyelidikan, atau disertasi bagi pengajian secara kerja kursus dan penyelidikan, atau Laporan Projek Sarjana Muda (PSM).

TEMPERATURE CONTROLLED NiCd BATTERY CHARGER

HAZER BIN MOHAMAD SAYUTI

This thesis is submitted as partial fulfillment of the requirements for the award of the
Bachelor of Electrical Engineering (Hons.) (Power System)

Faculty of Electrical & Electronics Engineering
Universiti Malaysia Pahang

NOVEMBER, 2008

TABLE OF CONTENTS

	PAGE
TITLES	i
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
ABSTRAK	vi
CONTENTS	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF APPENDICES	xiii

CHAPTER 1 INTRODUCTION

1.1 Overview	1
1.2 Objectives	3
1.3 Scope of project	3
1.4 Problem statement	4
1.5 Thesis organization	5

CHAPTER 2 LITERATURE REVIEW

2.1 NiCd Cell	6
2.1.1 Introduction to NiCd Cell	6
2.1.2 Advantages	7
2.1.3 Voltages	7
2.1.4 Charging	8
2.1.5 Charging method	9
2.1.6 Overcharging	9
2.2 Thermistor	10
2.2.1 Introduction	10
2.2.2 Advantages	11
2.2.3 Disadvantages	11
2.3 PIC Microcontroller	12
2.3.1 History	13
2.3.2 Variants	14
2.3.3 Microchip Programmer	14
2.4 MPLAB	15
2.5 PICBasic Pro Compiler	16
2.6 Driver Circuit	16

CHAPTER 3 METHODOLOGY

3.1 Introduction	18
3.2 Methodology	19
3.2.1 Developing power supply and charging circuit	21

3.2.2	Installation of temperature sensor	23
3.2.3	Developing LCD display circuit	25
3.2.4	Developing driver circuit	27
3.2.5	Developing PIC Circuit	29
3.2.5	Build PIC programming	30
3.3	Picture of hardware	34

CHAPTER 4 RESULT AND DISCUSSION

4.1	Introduction	35
4.2	Charging process	35
4.3	Charging temperature	38

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1	Conclusion	40
5.2	Future recommendation	41
5.3	Costing and commercialization	41

REFERENCES **43**

APPENDIXES

APPENDIX A	PIC Programming	45
APPENDIX B	PIC 16F877A Date sheet	48
APPENDIX C	High/Low Driver Data sheet	54
APPENDIX D	Thermistor TTC103 Data sheet	57
APPENDIX E	Voltage Regulator LM317 Data Sheet	59

APPENDIX F	Power MOSFET IRF540 Data Sheet	61
APPENDIX G	Table of price	63
APPENDIX H	Hardware of project	65

LIST OF TABLES

TABLE NO	TITLE	PAGE
3.1	Voltage versus temperature	25
4.1	Time of charging with the increasing in voltage	36
4.2	Time of charging with the increasing in battery Temperature	38

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
1.1	NiCd charging rate versus temperature	4
2.1	40 pin PIC 16F877A	12
3.1	Flow chart the whole project	20
3.2	Power supply and charging circuit	22
3.3	Thermistor TTC103	23
3.4	Characteristic Curve	24
3.5	2x16 LCD Display	25
3.6	LCD display connection	26
3.7	Driver circuit	28
3.8	Developing PIC circuit	29
3.9	Methodology of Programming	31
3.10	Example of Hex files	32
3.11	Hardware and labeling	34
4.1	Charging voltage versus Time	37
4.2	Battery temperature versus Time	39

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	PIC Programming	45
B	PIC 16F877A Data Sheet	48
C	High/Low Driver Data Sheet	54
D	Thermistor TTC103 Data Sheet	57
E	Voltage Regulator LM317 Data Sheet	59
F	Power MOSFET IRF540	61
G	Table of Price	63
H	Hardware of the Project	65