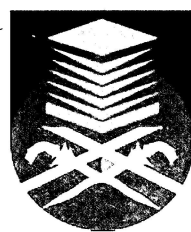


LEAD ACID BATTERY CHARGER AND STATE OF CHARGE WITH LIGHT EMITTING DIODE LAMP

This thesis is presented in partial fulfillment for the award of the

Bachelor of Engineering (Hons.) Electrical

UNIVERSITI TEKNOLOGI MARA (UiTM)



اَوْنِيُوْرَسِيْتِي تِيْكْنُوْلُوْجِي مَارَا
UNIVERSITI
TEKNOLOGI
MARA

IQMAL HAKIM BIN ISMAIL

2009637718

**FACULTY OF ELECTRICAL
ENGINEERING**

UNIVERSITI TEKNOLOGI MARA (UiTM)

40450, Shah Alam, Selangor, Malaysia

July 2013

ACKNOWLEDGEMENT

Alhamdulillah and thanks to Him for all. With the time and health giving by Him, this thesis is able to be finish on time even though there are many problems and obstacles during the journey to finish the thesis. With His blessing, all of them shall be solve swiftly.

Foremost, I would like to express my sincere gratitude to my supervisor Puan Puteri Nor Ashikin Binti Megat Yunus for the continuous support of my study in this project, for her patience, motivation, enthusiasm and immense knowledge. Her guidance helped me in all the time of research and writing of this thesis.

I addition, I would like to thank my family especially my parents Ismail Bin Tamby Abdullah and Apsah Binti Ahmad on their support and encouragements throughout my whole life.

Last but not least, I would like to express my appreciations to those who has contributed directly or indirectly in the process to finish this project and thesis

ABSTRACT

Night market is a very common place in Malaysia where people go and do small businesses. Since this event happens at night, the presence of light is very important. Most sellers usually used a generator as an alternative to supply electricity to their lamps. However, the cost for a generator and fuel can be expensive. The usage of generator also has its side effects. Generator burns fossil fuel to generate electricity. Whenever fuel is burnt, there is obviously some level of air pollution released in the form of exhaust gases. Besides air pollution, generators also produce another type of pollution which is noise. Noisy surrounding can somehow affect the mood of customers to shop. By using a battery, these pollutions would not occur as it do not produce sound and do not emit chemicals into the air.

The main purpose of this project is to design and build a rechargeable battery indicator that can be used to supply LED. The type of battery used is a lead acid battery. This battery is then connected to an indicator that will indicate the state of charge (SOC) of the battery. The proposed method of SOC that is used is voltage based estimation. This uses the battery cell voltage as the basis for calculating SOC or the remaining capacity. A proper design must be done so that the device works as expected.

The LM317 voltage regulator is used in the charger circuit to regulate the voltage and convert the current it into complete direct current. The prototype used LED bar graph as visual in determining the state of charge. The LED bar graph lit up gradually depending on the battery voltage. This bar graph is controlled by the bar display, LM3914. The two converters are combined together into one circuit by using a 3 pole toggle switch. All tests are done by using a 12V lead acid battery with 7.2 AH. Results from tests were then used for calibration process in order to achieve accuracy.

TABLE OF CONTENT

TITLE	PAGE
TITLE	i
LECTURER'S APPROVAL	ii
STUDENT'S DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
TABLE OF CONTENTS	vii
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF ABBREVIATIONS	xi
CHAPTER 1	
INTRODUCTION	1
1.1 BACKGROUND STUDY	1
1.2 PROBLEM STATEMENT	3
1.3 OBJECTIVES	4
1.4 SIGNIFICANCE OF PROJECT	5
1.5 SCOPE OF PROJECT	6
1.6 THESIS OUTLINE	7
CHAPTER 2	
LITERATURE REVIEW	8
2.1 INTRODUCTION	8
2.2 LEAD ACID BATTERY	9
2.3 METHOD TO DETERMINE STATE OF CHARGE	12
2.4 TRANSFORMER	17
2.5 RECTIFIER	19

2.6 VOLTAGE REGULATOR	21
2.7 BAR DISPLAY DRIVER	22
2.8 LED BAR GRAPH	23
CHAPTER 3	
METHODODOLOGY	24
3.1 INTRODUCTION	24
3.2 FLOWCHART	25
3.3 LEAD ACID BATTERY CHARGER	29
3.4 STATE OF CHARGE	31
CHAPTER 4	
RESULT AND DISCUSSION	33
4.1 ACCURACY TEST AND CALIBRATION PROCESS	33
4.2 ENDURANCE TEST	40
CHAPTER 5	
CONCLUSION	42
REFERENCE	43
APPENDICES	45