DESIGN AND DEVELOPMENT OF A KINETIC ENERGY CHARGER

Design Project

CHESTER ADRIAN R. BULAON

JOHN EDWARD O. PEDERNAL

College of Engineering and Information Technology

CAVITE STATE UNIVERSITY

Indang, Cavite

November 2011

DESIGN AND DEVELOPMENT OF A KINETIC ENERGY CHARGER

Undergraduate Design Project
Submitted to the faculty of the
Cavite State University
Indang, Cavite

In partial fulfillment of the
Requirements for the degree of
Bachelor of Science in Electronics and Communications Engineering

BULAON, CHESTER ADRIAN R.

PEDERNAL, JOHN EDWARD O.

November 2011

ABSTRACT

BULAON, Chester Adrian R. and PEDERNAL, John Edward O. DESIGN AND DEVELOPMENT OF A KINETIC ENERGY CHARGER. Undergraduate Design Project, Bachelor of Science in Electronics and Communications Engineering, Cavite State University, Indang, Cavite. November 2011, Adviser: Engr. Michael T. Costa.

The study primarily aimed to design and developed a Kinetic Energy Charger through experimentation and research, that will promote renewable energy with the use of kinetic energy. It also utilizes the use a linear generator commonly used on shake type flashlight as a source of electricity that will charge cellular phone batteries.

The device was created at Asis 1 Mendez, Cavite and was evaluated at the Engineering Science Building of Cavite State University Indang, Cavite.

Trials of evaluation were made to find the charging time of a nickel metal hydride battery rated 1.2 volts and 2100 miliAmpere-hour. Trials of evaluation include running, walking and other activities involving leg movement.

After the device underwent series of evaluation and redesigning, the device was found out to have insufficient generated power to charge cellular phone. Though it can store induced current produced by the linear generator, it was still not enough to fully charge two rechargeable nickel metal hydride batteries in parallel for 24 hours.

TABLE OF CONTENTS

	Page
APPROVAL SHEET	ii
BIOGRAPHICAL DATA	iii
ACKNOWLEDGEMENT	v
ABSTRACT	vii
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF APPENDICES	x
LIST OF APPENDIX TABLES	xi
LIST OF APPENDIX FIGURES	xii
INTRODUCTION	1
Significance of the Study	2
Objectives of the Study	3
Time and Place of the Study	3
Scope and Limitation	4
Definition of Terms	4
REVIEW OF RELATED LITERATURE	7
NiMHvs.NiCadvs.LiIon	7
Charging a battery	7
Rechargeable Battery	8
M2E (Motion 2 Energy) Kinetic Power	9
Electromagnetic Induction Air-core Hollow Coil	9
Electromagnetic Induction by a Moving Magnet	10

Neodymium Magnet..... 12

Homemade Electrical Generator..... 13

DC Converter And Electrical Storage For linear generator..... 15

MATERIALS AND METHODS..... 17

Materials..... 17

Linear Generator..... 17

Rechargeable Batteries..... 17

Other Materials..... 17

Methods..... 18

Design and Fabrication of the Linear Generator..... 18

Interfacing the Charging Unit..... 19

Casing of the device..... 19

Testing and Evaluation..... 19

Cost Computation..... 20

RESULTS AND DISCUSSION..... 21

Description of the System and Design Justification 21

Data Gathered..... 24

Testing and Evaluation 25

Cost Computation 27

SUMMARY, CONCLUSION AND RECOMMENDATIONS..... 28

Summary..... 28

Conclusion..... 29

Recommendation..... 29

APPENDICES..... 31

BIBLIOGRAPHY..... 55

LIST OF TABLES

Table	Title	Page
1	Cost Computation.....	32

LIST OF FIGURES

Figure	Title	Page
1	Block Diagram.....	22
2	Circuit Diagram.....	23

LIST OF APPENDICES

Appendix	Title	Page
A	Data Gathered from Evaluation.....	32
B	Figures.....	33
C	Data Sheets.....	41

LIST OF APPENDIX TABLES

Table	Title	Page
1	Data gathered using two branded Nickel Metal Hydrite batteries in parallel with a fix distance of 4000 meters.....	32
2	Data gathered using two branded Nickel Metal Hydrite batteries in parallel with a fix speed of 7mph using a treadmill.....	32
3	Data gathered with the redesigned linear generator (800 turns increased in each linear generator coil).....	32

LIST OF APPENDIX FIGURES

Figure	Title	Page
4	Packaging of the device.....	33
5	CD-R King AA Nickel Metal Hydride Rechargeable Batteries.....	34
6	Eveready AA Nickel Metal Hydride Rechargeable Batteries.....	35
7	Linear generator with 1200 turns of winding.....	35
8	Linear generator with 2000 turns of winding.....	36
9	Increasing the coil windings of the linear generator.....	37
10	Evaluation of the redesigned linear generator.....	38
11	Evaluation of the device while jogging.....	39
12	Evaluation of the device while walking.....	40
13	Evaluation of the device using a treadmill.....	49

DESIGN AND DEVELOPMENT OF A KINETIC ENERGY CHARGER

Bulaon, Chester Adrian R.

Pedernal, John Edward O.

[1/]An undergraduate thesis presented to the faculty of the Department of Computer and Electronics Engineering, College of Engineering and Information Technology, Cavite State University, Indang, Cavite in partial fulfillment of the requirements for the degree of Bachelor of Science in Electronics and Communications Engineering (BSECE) with contribution No. _____. Prepared under the supervision of Engr. Michael T. Costa.

INTRODUCTION

Our government has extended its concern about energy crisis and other problems affecting our environment. High electric bills and less amount of power is becoming one of the big problems in every home in the country. That is why the government introduced us to energy conversion, through alternative power source and renewable energy.

One major advantage of renewable energy is it is inexaustible, therefore sustainable and never run out. Renewable energy devices generally require less maintenance than traditional generators. They are being derived from natural and available resources which reduce the costs of operation.

Even more importantly, renewable energy produces little or no waste products such as carbon dioxide or other chemical pollutants, so has minimal impact on the environment. Renewable energy projects can also bring economic benefits to many regional areas, as most projects are located away from large urban centers and suburbs of the capital cities.