

**DESIGN AND CONSTRUCTION OF A PORTABLE ENERGY GENERATOR
FOR RECIPROCATING MOTION EXERCISE MACHINE**

Undergraduate Thesis
Submitted to the Faculty of the
College of Engineering and Information Technology
Cavite State University
Indang, Cavite

In partial fulfillment
of the requirements for the degree
Bachelor of Science in Electrical Engineering

**JOHN MARVIN A. GALOTOS
FLORENTINO C. MORADA JR**
May 2018

ABSTRACT

GALOTOS, JOHN MARVIN A. and MORADA, FLORENTINO JR. C. Design and Construction of a Portable Energy Generator for Reciprocating Motion Exercise Machine Undergraduate Design Project. Bachelor of Science in Electrical Engineering. Cavite State University, Indang, Cavite. May 2018. Adviser Engr. Efren R. Rocillo.

The study was conducted from December 2017 to March 2018 at Bagbag I, Rosario, Cavite. The purpose of the study is to design and construct a portable energy generator for reciprocating motion exercise machine. Specifically, this study aimed to: (1) design and construct a motion converter device that can convert linear motion into a circular motion; (2) determine the power generated by the system; (3) determine the magnet to be used in the system; (4) assembly of the portable energy generator; (5) test and evaluate the performance of the portable energy generator through interfacing it to the reciprocating motion exercise machine and; (6) to conduct overall cost computation. The project was finished, tested and evaluated at Adman Fitness Gym in University Campus Mall in Cavite State University, Indang, Cavite.

The portable energy generator is a power generating system that can generate power through exercise by the use of weight machines which has a reciprocating motion. The study would serves as an alternative source of electrical energy that can be used to power up lights while doing an exercise. The parameters such as revolutions per minute (rpm), linear velocity, ac voltage, ac current, dc voltage and dc current were measured. The results and evaluation showed the different parameter readings of the three reciprocating exercise machines such as lat pushdown, seated cable row and cable crossover machine. It can also be seen in the results the differences of the three reciprocating machines on how much time it takes for an individual to manually full charge the battery in terms of hauling a weight

such as 10 lbs. and 20 lbs. The results gathered from the field study showed the feasibility of this study to be an alternative source of electrical energy which can be used on lighting application and indicate the prospect of further improvement and future research. Based on the results of the study, the proponents highly recommended other researchers to build and to focus their interest on the development of renewable sources of energy which can sooner or later help our environment and the economy. The total cost of the study amounted to P36,080.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA.....	iii
ACKNOWLEDGEMENT.....	v
ABSTRACT.....	x
LIST OF TABLES.....	xv
LIST OF FIGURES.....	xvi
LIST OF APPENDIX TABLES	xviii
LIST OF APPENDIX FIGURES.....	xx
LIST OF APPENDIX COMPUTATIONS.....	xxi
LIST OF APPENDICES.....	xxii
INTRODUCTION.....	1
Statement of the Problem.....	2
Objectives of the Study.....	3
Significant of the Study.....	3
Time and Place of the Study.....	4
Scope and Limitation.....	4
Definition of Terms.....	5
REVIEW OF RELATED LITERATURE.....	7
METHODOLOGY.....	37
Materials.....	37
Methodology.....	37

Design and construction of a linear motion converter.....	37
Determine the power generated by the system	39
Determine the magnet to be used in the system.....	40
Assembly of the system	43
System Test and Evaluation	44
RESULTS AND DISCUSSION.....	45
Description of the System.....	45
Principle of Operation.....	46
Construction of the Portable Energy Generator for Reciprocating Motion Exercise Machine	46
Components of the System.....	47
Battery Size.....	47
Generator Specifications	48
Construction of coil	51
Construction of Charging Circuit	52
Specifications of the Inverter	53
Gearing System	53
Interfacing of the Generating System to the Reciprocating Motion Exercise Machine	54
Assembly of the whole System	56
Measurement of Rotational Speed, Linear Velocity, Current and Voltage	56
Test and Evaluation of the System	57
Cost Computation	73
SUMMARY, CONCLUSION, AND RECOMMENDATIONS.....	74

Summary.....	74
Conclusion.....	75
Recommendations.....	76
REFERENCES.....	77
APPENDICES.....	79