

THERMOELECTRIC POWER GENERATION DEVICE

This thesis is presented in partial fulfillment for the award of the
Bachelor of Engineering (Hons.) in Electronic Engineering
UNIVERSITI TEKNOLOGI MARA MALAYSIA



AHMAD AMIRULHAFIZ BIN MOHD NOR

**FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA MALAYSIA
40450 SHAH ALAM, SELANGOR, MALAYSIA**

JANUARY 2014

ACKNOWLEDGEMENT

I would like to express my gratitude to Allah S.W.T, The Most Gracious and The Most Merciful for giving me strength and ability throughout the process of completing this final year project.

I am most grateful to the most kind heartedness supervisor, P.M. Aisah Mohamed for her patience, ideas and guidance throughout the year of my final year project. My token of appreciation also goes to my lecturer, Encik Syed Abdul Mutalib Al Junid for his help and kindness in helping me to complete this thesis.

Apart from that, I would like to thank my wife and parents who have been so tolerant and supportive all these years. Last but not least, my gratitude goes to my friends who support me and lending their hands whenever I need them.

ABSTRACT

This paper presents a device that can generate electricity by using heat. Thermoelectric module is used as a mechanism to convert heat into electricity. In order to produce a useable output power, a step-up circuit was constructed and implemented together with the module. A small and portable power generation device was successfully designed that can generate voltage up to 5.6V with efficiency of 70%. The performance of the device had been analyzed by manipulating the temperature difference between the two sides of thermoelectric module. I-V curve was also obtained and it shows that the maximum performance of the device can be achieved when the voltage and current is at its medium level. The device can be used to power up almost any electronic devices which require 5V operating voltage; microcontroller, sensor, smartphone-charger, LED and etc.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	TITLE	i
	DECLARATION	ii
	ACKNOWLEDGEMENT	iii
	ABSTRACT	iv
	TABLE OF CONTENTS	v
	LIST OF FIGURES	viii
	LIST OF TABLES	x
	LIST OF ABBREVIATION	xi
CHAPTER 1	INTRODUCTION	
	1.1 Project Background	1
	1.2 Problem Statement	3
	1.3 Objective	4
	1.4 Scope of Work	5
	1.5 Organization of Project	6

CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

In 1820, a scientist by the name of Thomas Seebeck discovered Seebeck effect. The discovery was made when he mistakenly connected two parts of semiconductor material which then disturbed a compass magnet nearby. This phenomenon initially described by Seebeck as something related to earth's magnetic field. However, not long after that he realized that an electrical current was actually induced by thermoelectric force and trigger the magnet. This phenomenon is critical in history of science because it proves that temperature difference in between two conducting material can produce a potential difference thus able to drive an electrical current if a resistive load is connected to it [1].

The reverse mechanism of Seebeck effect was discovered by Jean Peltier. He found out that when two dissimilar metals were conducting an electrical current, either hot or cold temperature is produced. The discovery promotes the application of thermoelectric material in refrigeration areas.