

SMART SHOES CHARGER

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PROJEK SARJANA MUDA II

Tajuk Projek : Smart Shoes Charger

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Thank to my beloved father, mother and friends. Also thank to my supervisor of Final Year Project, Engr. Afifah Maheran Binti Abdul Hamid.

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ABSTRACT

This project is to design a charger that able to implement into shoe in order to generate electricity to charge gadget during walking. For this project I was mainly focus on design a shoes charger for cell phone. This project will use a DC motor for generate electricity for charging cell phone during walking. This motor will act as a generator or power source of this smart shoes charger. The purpose of developing this project is to solve the problems of time consume for waiting cell phone fully charge. Besides this project design also can convert our wasted energy during walking into a usable electrical energy. From the result the generator will produce about 2-4 V DC voltage from the walking action. Due to this output voltage is no achieve the desired voltage of charging. So a DC/DC boost converter circuit will be design to increase the output voltage to the desired charging level.

ABSTRAK

Projek ini bertujuan mereka bentuk satu pengecas yang boleh diletakkan dalam kasut dan boleh menghasilkan elektrik untuk mengecas peranti atau alat elektronik pada masa berjalan. Pada projek ini saya adalah focus terhadap mereka bentuk satu pengecas yang boleh digunakan untuk mengecas telefon bimbit semasa berjalan. Dalam projek ini, “DC motor” akan berfungsi sebagai penjana. Tujuan mereka bentuk projek ini ialah untuk menyelesaikan masalah yang dihadapi oleh pengguna iaitu menghabiskan masa untuk menunggu telefon bimbit penuh cas. Selain itu, reka bentuk projek ini boleh menukar tenaga yang kita gunakan semasa berjalan kepada tenaga yang berguna (tenaga elektrik). Daripada keputusan yang saya dapat daripada praktikal, “DC motor” akan menghasilkan 2-4V apabila kita berjalan. Kuasa dihasilkan ini tidak dapat digunakan untuk mengecas telefon bimbit maka satu litar “DC/DC boost convertor” dihasilkan untuk menaikkan voltan.

TABLE OF CONTENT

CHAPTER	TITLE	PAGE
	PROJECT TITLE	i
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	vi
	ABSTRACT	vii
	ABSTRAK	viii
	TABLE OF CONTENT	ix
	LIST OF FIGURES	xii
	LIST OF TABLES	xiv
	LIST OF DIAGRAMS	xv
	LIST OF ABBREVIATIONS	xvi
	LIST OF APPENDICES	xvii
I	INTRODUCTION	
	1.1 Project Background	1
	1.2 Objectives	2
	1.3 Problem Statements	3
	1.4 Work Scope	4
	1.5 Advantages Of The Project	5
	1.6 Overview of the Report	7

II LITERATURE REVIEW

2.1 Concept	8
2.2. Overview of dc motor & dc generator	11
2.3 Types of gear	14
2.4 Capacitor	15
2.4.1 Polarized capacitor	16
2.4.1.1 Electrolytic Capacitors	16
2.4.1.2 Tantalum Bead Capacitors	16
2.4.2 Unpolarised capacitors	17
2.5 Switching regulator	17
2.6 Boost regulator IC	20
2.7 Standard Charger	21
2.8 Shoes	22

III Methodology of Project

3.1 Introduction	23
3.2 Project planning	25
3.3 System Process	26
3.4 Circuit Development	26
3.4.1 Small generator	27
3.4.2 Gear	28
3.4.3 Boost voltage regulator circuit	29
3.5 Printed Circuit Board	32

IV	RESULT & ANALYSIS	
	4.1 Analysis Output Result from Generator	33
	4.2 Boost Converter Circuit Analysis	35
	4.3 Prototype Analysis	37
	4.3.1 Prototype before implement into shoe	37
	4.3.2 Prototype after implement into shoe	38
	4.4 Performance analysis	39
	4.4 Prototype	41
V	DISCUSSION	
	5.1 Discussion	42
VI	CONCLUSION & RECOMMENDATION	
	6.1 Conclusion	45
	6.2 Recommendation	46
	REFERENCES	48
	APPENDICES	49

LIST OF FIGURES

NO.	TITLE	PAGE
2.1	Explanation of Faraday's law and it equation	9
2.2	Current produce based on Len's law	10
2.3	Rotary Power Generation in Heel	10
2.4	Four Pole DC Motor or Generator	11
2.5 (a)	Coil at $\theta=0^\circ$	12
2.5 (b)	Coil at $0^\circ<\theta<90^\circ$	12
2.5 (c)	Coil at $\theta=90^\circ$	12
2.5 (d)	Coil at $90^\circ<\theta<180^\circ$	12
2.5 (e)	Coil at $\theta=180^\circ$	13
2.5 (f)	Coil at $180^\circ<\theta<270^\circ$	13
2.6	Generated current	13
2.7	Generated current outputs with split ring and structure of split ring	14
2. 8	Photo of polarized capacitor and it circuit symbol	16
2.9	Tantalum bead capacitors	17
2.10	Photo of unpolarized capacitor and it circuit symbol	17
2.11	Buck converter	18
2.12	Boost conveter	18
2.13	Waveforms of boost converter	18
2.14	Buck-boost converter	19
2.15	Cuk converter	19
2.16	USB Travels Charger	21

2.17	Conventional charger	21
2.18	Concept of shoes charger	22
3.1	Small generator	27
3.2	The design of small generator connected with gearbox	27
3.3	Spur gear and face gear used in the project	28
3.4	Boost voltage regulator circuit	29
3.5	Internal Construction of IC MAX 756	30
3.6	PCB circuit design for this project	32
3.7	Bottom side of PCB design	32
4.1	The output voltage of generator measured by using oscilloscope	33
4.2	Waveform produced by generator before implement into shoes	34
4.3	Frequency of Output Waveform	34
4.4	Boost Converter Circuit	35
4.5	Output Voltage of Boost Converter Circuit for various Input Voltage	36
4.6	Output voltage produced measured by using oscilloscope	37
4.7	Output waveform after generator connect to boost converter circuit	37
4.8	Output voltage produced measured by using oscilloscope	38
4.9	Output waveform after generator connect to boost converter circuit	38
4.10	Current store in battery cell of phone against number of step	39
4.11	Side view of final prototype after implement into shoe	41
4.12	Charging cell phone by using this project design	41

LIST OF TABLES

NO.	TITLE	PAGE
2.1	Description of each common type of gear	15
2.2	Specification of each type of boost regulator IC	20
3.1	Gear ratio for each Gear	28
3.2	Pin Description of IC MAX 756	31
4.1	Output Voltage of Boost Converter Analysis	35
4.2	Charging performance of generator	39
4.3	Comparison of charging rate	40
4.4	Weight of part involve in project	41

LIST OF DIAGRAMS

NO.	TITLE	PAGE
3.1	Methodology of the project	25
3.2	Block Diagram of Process	26
3.3	Circuit Block Diagram	26

LIST OF ABBERRVIATIONS

AC	- Alternating Current
BJT	- Bipolar Junction Transistor
DC	- Direct Current
EMF	- Electromagnet motif force
IC	- Integrated Circuit
IGBT	- Insulated Gate Bipolar Transistor
MOSFET	- Metal–Oxide–Semiconductor Field-Effect Transistor
PCB	- Printed Circuit Board
PTZ	-Piezoelectric Lead Zirconate Titanate
SMT	-Surface Mount Technology
THUNDER™	-Thin Layer Composite Unimorph Ferroelectric Drive and Sensor

LIST OF APPENDICES

NO.	TITLE	PAGE
A	Specification and Description of MAX 756	49
B	Specification and Description of 18R223C	52

CHAPTER I

INTRODUCTION

This Chapter 1 is contains about the introduction of the project where it involve of objectives, problem statements, scope, methodology, and report structure.

1.1 Project Background

Nowadays our lives are more depend on technology, so electronic device become more and more important. People reliance upon electronic devices has risen significantly and most people demands for decreased size and enhanced capabilities for new ways to supply electric energy to these devices. As we know most of the electricity supply is generated by using petrol. Since the petrol will be finish at the future, so we need find out the new way to generate electric energy.

Everyday people are always rushing in doing jobs or works. Therefore, they will have less time to spend on waiting to charge their gadget. So most of people desire have a movable charger that can charge the electronic device even we carry the gadget device around doing job. Besides, people also can charge their gadget (cell phone) for make an emergency call even cell phone is out of power.

Traditionally, batteries have been sufficient to charge the electronic device, but this solution will become less practical and inefficient as demands evolve. Further, normal batteries have a limited lifetime, and their frequent replacement can be costly to anyone. Therefore, this project is one of the solutions for the problem of spending time waiting to charge the electronic device.

This project is to study and design a smart shoes charger that can generates electricity to charge gadget while moving. The idea of this project is using motor act as generator generate electricity during walking. As we know every day we consume a lot of energy during walking. So this project is to design shoes that can convert kinetic energy into a usable energy for charging gadget devices. This project is based on energy harvesting and electromagnetic concept.

As a result, users are able to charge their gadget while walking or running with the charger in their shoes and continue their daily activities without worrying their gadget will be out of power. Users do not need to spend time charging their gadget.

1.2 Objectives

The objectives of this project are:

- i. To do study and research on how the DC motor can act as a generator to generate electricity.

- ii. To design the power generation part.
- iii. To design a suitable circuit that convert the output of DC motor to meet the requirement to charge electronic gadgets.
- iv. To implement the product design into shoe and it able use for charging cell phone during walking.

1.3 Problem Statements

Nowadays people always rush in doing job and everyday a lot of thing should be we do and solve. So we can hear a lot of people say that “no enough time”. Unfortunately time never stop for waiting us, so we need find out the way to save time. Recently electronic gadgets play a very important role in our daily life. Normally the charger is provided by the gadget’s manufacturer, user need connect the charger to power supply. User need spend a lot of time for wait the gadget to be fully charged.

Besides the electricity power supply is generate by using oil, charcoal and many more natural resources which cause the pollution to the environment. So, charging device will increase the usage of electricity, thus indirectly increase the pollution to the environment. Besides these natural resource will be finish at the future. So a renewable energy is needed to fulfill our demand at the future. Therefore an environment friendly charger is needed to reduce the environment pollution.

Furthermore, conventional charger cannot give the mobility to the users when charging their electronic device. Therefore user cannot go anywhere to do other work and need waiting until the electronic device fully charged.

1.4 Work Scope

The work scopes of this project include the study and research on how to design shoes that can act as a charger during walking. The research on the way to generate electricity during walking is very important to make sure this project can be success. The study and research are focus on the energy harvesting concept. Actually a lot of method can be used to generate electricity such as by using sunlight, thermal energy, piezo effect and electromagnetic field. In order to find out the most suitable method to generate electricity during walking, the aspect of size of element, durability, power produced by that element should be considered.

After the study and research have been carried out, the dc motor was choose as the generate electricity element for this project. In this project the motor will be act as a generator. The motor will be tested to observe the real performance and the output generates in working condition. Normally the output voltage for charging should be 5V. In order to achieve the desire output, a DC/DC boost converter and filter circuits should be designed.

The design of boost converter is base on the output voltage of dc motor and desired output voltage for charging. After that the simulation on the circuits will be carried out. In the dc/dc boost converter circuit a boost voltage circuit will be used. A lot of literature review on the characteristic of IC should be done and then choose the most suitable IC that can satisfy the project requirement. After that the circuit will be test on the breadboard. If there is any did not meet the requirement desired, adjustment will be made.

The last work scope is, hopefully to produce the final product. The circuit and the dc motor need to be implemented correctly in shoes to make sure that the dc motor and circuit can be functional and the users can use the shoes as comfortable as it can. The

safety of the product also will be observed and tested under all condition to ensure the project meet all the safety requirements.

1.5 Advantages of the Project

i. Save time consume

Users can charge their gadget while doing daily activities such as moving, like walking or running. As we know, today's life is getting busy as time flies. Therefore the people should optimize their time wisely. Besides, electronic gadgets play a very important role in completing or doing daily activities. Currently, the charger provided by gadget's manufacturer, users need to connect the charger to the power supply. User has to wait for their gadget to be charged. As a result, users will waste a lot of time waiting for their gadget. This project is a solution to avoid the problem of running out of power of their gadget of to this where users can charge their electronic gadget while moving.

ii. Save the environment

This project is to develop a charger that can generate its own electricity using electromagnetism concept (will be discuss later). It can be categorized as a renewable energy which means energy that naturally replenish. The normal charger uses the power source that supplied by electric provider and almost all electric providers generate electricity from oil, charcoal and many more natural resources. So this project can be say that environment friendly because it not causes the pollution.

iii. Easy to use

This project is designed to be easy to use by all level of citizens. The small generator (DC motor) and the circuit will be designed to suit the shoes design. Users only need to

wear the shoes and connect the device to their gadget. Small generator and the circuit implemented in the shoes will be placed carefully and maintain the comfort ability of the shoes.

iv. Economical

Due to this device generates its own electricity to charge gadget by applying mechanical force on it, users do not have to pay for electrical usage, unlike the normal charger using power supply. So, it can save a lot of money and users can still charge their gadget.

v. Healthy lifestyle

This project also can promote a healthy lifestyle as it need mechanical force. In other words, body movement like walking or running is useful for it to be functional. Users can do daily exercise like jogging, running and playing games and at the same time charging their electronic device.

1.6 Overview of the Report

This report can be divided into five chapters. Below is brief explanation of each chapter.

Chapter 1- Briefly discusses about the introduction of the project. This chapter covers objectives, problem statement, work scopes, and advantages of this project.

Chapter 2 - Covers the literature review and theoretical aspect of this project. This chapter is an important part of the project in which it discusses the concept used and also about the small generator (DC motor) as the main element of the project. All the aspects needed to be considered such as type, specification, output power of the small generator are covered in this chapter.

Chapter 3 -Covers the methodology used in this research and development. The small generator hardware research is discussed as well as the construction and fabrication of the circuit that will be used in this project. For the simulation, the circuit is tested using engineering software.

Chapter 4 - Discusses the analysis and results. The result will determine whether the small generator that is being tested is compatible and suitable for this project.

Chapter 5 - Summarizes and discusses the overall status of the research of the project and also the discussion about it. Future recommendations and suggestions for this project also included in this chapter.