WIND ENERGY CHARGER FOR RIDER (WECFR)

MOHAMAD JAMIL BIN A SAMAD

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Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer

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Disahkan oleh:

Siti Nursiah Binti Nain
Ketua Jabatan Elektronik Industri
Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Hang Tuah Jaya, 76100 Durian Tunggal, Melaka

"Saya akui laporan ini adalah hasil kerja saya sendiri kecuali ringkasan dan petikan yang tiap-tiap satunya telah saya jelaskan sumbernya."

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Nama Penulis : MOHAMAD JAMIL BIN A SAMAD

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APPRECIATION

Praise to Allah, for His grace, I was able to carry out this Projek Sarjana Muda (PSM). I would like to take this opportunity to express my appreciation to all who have helped me when perform this PSM especially;

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A SAMAD BIN JURAMI

JAMILAH BINTI SAAD

My supervisor

SITI HUZAIMAH BINTI HUSIN

My close friend

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ABSTRACT

This project aims to build a charging system using wind energy as a source to the riders. This system uses the wind to continue and supplying electricity directly to mobile phones. This system has four stages beginning with the load followed by generators, converters and end with the product. From load, there happens system where generator can produce electric energy. This cause from load moves relatively and induced the magnetic field. From vary of time magnetic field induced, there have current flow. This process move on to the next stage which is stage of converts alternate current to direct current. Starting with step-down transformer followed by rectifier. Next is smoothing or called filter with finish by voltage regulator.

ABSTRAK

Projek ini bertujuan membina sebuah sistem pengecas mengunakan tenaga angin untuk penunggang. Sistem ini menggunakan angin untuk terus membekal tenaga elektrik terus ke telefon bimbit. Sistem ini mempunyai empat peringkat bermula dengan beban diikuti penjana, penukar arus, dan diakhiri dengan keluaran. Dari beban, berlaku sistem dimana penjana mampu menjana tenaga elektrik. Ini berpunca dari pergerakan beban secara relatif dan mampu menghasilkan medan magnet. Penghasilan medan magnet terjadi, pergerakan arus berlaku. Proses ini akan bergerak ke peringkat seterusnya dimana peringkat ini dipanggil peringkat penukar arus ganti bertukar kepada arus terus. Peringkat ini bermula dengan pengubah penurunan diikuti penerus. Proses seterusnya dalam peringkat ini adalah dipanggil penapis atau melicinkan dan diakhiri dengan pengatur voltan.

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LIST OF ABBREVIATION

A	-	Ampere
AC	-	Alternate Current
DC	-	Direct Current
EMF	-	Electromotive Force
I	-	Current
PC	-	Personal Computer
R	-	Resistor
μ	-	micro
USB	-	Universal Serial Bus
V	-	Volt/Voltage
W	-	Watt

CHAPTER I

INTRODUCTION

This chapter will discuss briefly the project flow from introduction, objectives and problems statement of project. Hence, followed by the scope of work and the description of the methodology. Each sub-topic relates each other in order to make the readers understand about the flow of the project.

1.1 Introduction of Project

Wind is one of the most reliable sources to create electric energy besides solar and hydro energies. Ari Reeves wrote that "the use of wind for electricity generation has been expanding rapidly in recent years, due largely to technological improvements, industry maturation and an increasing concern with the emissions

associated with burning fossil fuels" [1, p 4]. The author also wrote "There is still more room to grow, as only a small portion of the useable wind resource is being tapped" [1, p 4]. In United Stated of America, US Department of Energy stated that "In 2006, President Bush emphasized the nation's need for greater energy efficiency and a more diversified energy portfolio" [2, p 1]. In Malaysia also already use wind as source for electrification. The first wind turbine in Malaysia was installed at Pulau Layang-layang, Sabah by Tenaga Nasional Berhad (TNB) in November 1995 [3]. Pulau Perhentian also houses the only tri-hybrid power system in the country which in addition to the wind turbine [3][4][5].

Zuhairuse Md Darus et al wrote that "Wind energy is considered a green power technology because it has only minor impact on the environment. Wind energy plans produce no air pollutant or greenhouse gasses. Wind energy conversion and solar energy system have great potential" [6, p 2]. The authors also wrote "Energy and environment are link at every level thus the requirement for mandatory assessment to address negative impact". TNB also mentioned the policy to designed wind turbine at rural area; "protect, preserve and revive the environment in all operations." [4, p 9]. By using wind, it is not creating such waste since every corner has wind blow.

Using wind as source gives more positive sides and advantages to user. The beneficial characteristics of wind power [1] include:

i. *Clean and inexhaustible fuel*
   No emission produced by wind power. It more to green technology.

ii. *Local economic development*
   The use of wind capable enhancing the living standards the community as a simple yet efficient installation.

iii. Modular and scalable technology

Large wind farms, distributed generation, and single end-use systems use for wind applications. Utilities can use wind resources advantageously to aid lessen load forecasting risks and stranded costs.

iv. Energy price stability

Wind energy reduces dependence on conservative fuels that are subject to cost and supply unpredictability.

v. Reduced reliance on important

Wind energy expenditures are not used to obtain fuels from overseas, keeping funds closer to residence, and decrease reliance on foreign governments that provide these fuels.

External charger using wind energy will give advantages to electronic device's users such as cell phone while taking long journeys rides such motorcycle. Usually when user has those kinds of devices, user cannot expect the device will running out the batteries. With this project it can charge the batteries using wind energy. By using wind as source of energy, it will convert into electric energy to make it more reliable continuous energy supply.

1.2 Problems Statement

There no power supply outlet in certain area such as on the road. Like other vehicles, motorcycle is one of the road main users. Usually, for two wheels vehicle type does not have power outlet to charge electronic devices since it exposed to the

surroundings. It gives some disadvantages to rider when their devices' battery is running low.

1.3 Objectives of the Project

Development Wind Energy Charger for Rider (WECFR) project based on objectives such as the following:

i. To design the efficient charger.
ii. To design continuous electric supply.
iii. To able use environment as power supply.
iv. To able explain the process of project.

1.4 Scope of Works

Here the scope of the project implementation as guideline to WECFR implementation of this project is clear:

i. Study on effects of movement between magnets and coils.

- The current changes direction when magnet changes movement.
- The current flows only when the magnet and the coils are moving relative to each other.
- The faster magnet moves between coils, the greater maximum deflection.

ii. Study about power converter.

- Electro-mechanical devices that converting the electrical energy. It uses to convert AC to or DC to, or frequency, or voltage and some of combination of these.
- Among the a lot of devices that are used for this rationale are;
    - Switched-mode power supply
    - Rectifier
    - Inverter
    - Motor-generator set
    - DC-DC converter
    - Transformer

iii. Study about generator and motor.

- Generator is a device that changes mechanical energy to electrical energy. It happen when load give the external power to make the motor start to rotate.
- Motor is providing motion either linear or rotating. It enables to move machines and impact of our daily life in every aspect.

iv. Focusing on advancing the rider about charging their output devices.

1.5 A Short Description of the Methodology

Here the short description about the methodology of the project as guideline to WECFR implementation of this project is clear:

i. By reading;
   - Journals
   - References books
   - Related magazines

ii. By discussing;
   - With final year project's supervisor
   - With experiences/ specialty lecturers
   - With experiences/ specialty outsiders

iii. Searching on internet

Other than that, there will be some brief explanations on the electronic device that will be used in the project throughout these two semesters.

1.6 Reporting Structure

Here the short report structure of the project as guideline to WECFR implementation of this project is clear:

i. *Chapter 2*

Background studies. All literature obtained that shows the link between research projects with the theory and concepts in the figure or an appropriate model.

ii. *Chapter 3*

Research methodology. The methodology of the study describes a method or approach used in problem solving projects.

iii. *Chapter 4*

Result and discussion. In this chapter, presenting the findings or results analysis of data obtained.

iv. *Chapter 5*

Conclusion and recommendations. Report concluded by stating the project summary the research has been done.

CHAPTER II

BACKGROUND STUDIES

In this chapter, there will some discussion of the research background related to the project. The overall result in the concept literature framework shows that the link between research projects with the theory and concepts in the figure or an appropriate model.

2.1 Magnetism

Faraday's Law stated that the electromotive force (EMF) generated is proportional to the rate of change of the magnetic flux [7].

$$\varepsilon = -N\frac{d\phi_B}{dt} \tag{2.1}$$

where $\emptyset_B$ = flux each turn (Weber)

N = number of turn

$\mathcal{E}$ = EMF of voltage (V)

As it is in static magnetic field, there no current flow at that time. While in vary time, magnetic field will induced the voltage. It will cause flow of current. The EMF measured in Volt, not in Newton.

Magnetic flux is amount of the magnetic field through the surface [7] related to equation 2. Magnetic flux depends on variation of time. There three ways may cause it.

i. Stationary loop in time with magnetic field
ii. Stationary loop area in static with magnetic field
iii. Time vary loop in time vary magnetic field

$$\phi_B = \int_S B.dS \tag{2.2}$$

where B = magnetic field density (Tesla)

S = surface area

Magnetic field is the perpendicular with the surface area of magnetic flux. It is the specific point of direction and magnitude like vector field as shown in Figure 2.1.

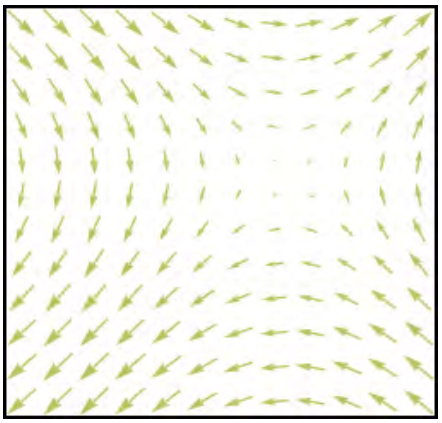

Figure 2.1: Vector Field

2.2 Wind Generator

Wind generator was built Charles F. Brush in Cleveland, in Ohio in 1888. Produced the power electricity in rated 12 kW (direct current-DC). It stands alone and forms small scale continuous electricity. In 1930, the large scale AC was constructed in USA. This machine is highly sophisticated, taking full advantages of the technology for modern wind turbine. It also improve the aerodynamic and structure design, material and mechanical, and also in electrical and control engineering. And now it became the smartest option for commercial electricity generation. Hence, the wind is the most clean, safe, renewable form of energy [8].

Table 2.1 show that the classification system for wind turbines. It shows that power rating can be produced depend on scale's size and rotor's diameter. Larger diameter of rotor, more power rating produced.