UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND DEVELOPMENT OF EFFICIENCY INCREASED ON PORTABLE VERTICAL AXIS WIND TURBINE SYSTEM FOR LIGHTING APPLICATION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical and Electronic Engineering Technology (Power Industry) with Honours.

by

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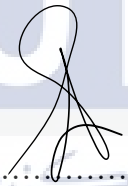
APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical and Electronic Engineering Technology (Power Industry) with Honours. The member of the supervisory is as follow:



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ABSTRAK

Penjaan kuasa turbin angin menegak (VAWT) untuk kawasan perumahan dan kawasan kampus adalah satu projek penjimatan kos yang boleh dapat membantu menjimatkan pengunaan elektrik dan mendapat kecerahan yang lebih baik untuk kapasiti bilik kecil dan bilik-bilik pensyarah di universiti. Matlamat rekabentuk projek ini adalah untuk menghasilkan turbin angin yang menangkap daya tarik angin dari kenderaan yang melalui jalan raya, dan juga angin nominal. Skop pengguna yang dipertimbangkan untuk projek ini adalah orang yang memerlukan keadaan lumen kecerahan yang lebih baik dalam kapasiti bilik kecil. Tujuan projek ini adalah untuk membuat turbin angin yang menghasilkan tenaga dari angin yang nominal dan angin dari kenderaan yang memlalui jalan raya. Kemudian disimpan dalam bateri 12v, dan kuasanya dipindahkan ke port pencahayaan untuk membezakan lampu yang mana sesuai untuk pengguna. Selain itu, produk ini akan dihasilkan dengan selamat untuk kesihatan, ringan dan bole tahan pada pelbagai cuaca. Batasan untuk reka bentuk dapat dilihat dari beberapa aspek, Apabila daya seret memukul bilah, bilah yang terpasang pada rotor penjana DC, berputar dan daya dihasilkan oleh motor. Penjana DC 24V kemudian menghasilkan tenaga elektrik dari tenaga kinetik bilah berputar, dan distorkan pada bateri yang boleh dicas semula asid plumbum tertutup untuk dicas. Pengatur voltan disambung ke bateri dan litar inverter mengunakan IC CD4538/4047 yang disambung ke pemacu MOSFET dan tahap output yang disambungkan oleh transformer 230 V primer 9V-0-9V, pengubah sekunder disambungkan secara terbalik. Output akan disambung ke beban yang menggunakan port lampu 220-230V,18W untuk mengukur dan mencata kecerahan serta lumen dalam $6m^2$ kapasiti bilik kecil.

ABSTRACT

Vertical Axes Wind Turbine (VAWT) power generation for housing areas and campus areas is one save cost project that can help to save electricity usage and get better brightness for small room capacity especially for letcurers rooms. The design goal of this project is to produce a wind turbine that captures drag force of the wind from the vehicles passing by the roadway, and also from nominal wind. Scope of users considered for our project is people who need a better brightness lumen conditions in small room capacity. The aim of this project is to create a wind turbine that generates power from vehicles passing by it, and also from nominal wind, which then stored in 12v motor battery, then power transferred to lighting port to be used by the users. Besides, the product will be manufactured in safety for health, light weight and weatherproof material. The limitations for the design can be viewed from few aspects. When the drag force hits the blades, the blades, which is attached to the rotor of the DC generator, spins and the power is generated by the motor. The 24V DC generator then generates electrical energy from the kinetic energy of the rotating blades, which then transferred to the sealed lead-acid rechargeable battery to be charged. A voltage regulator is connected to the battery.The inverter circuit using IC CD4538/4047 connected to MOSFET drivers and output stage which connected by 230V primary 9V-0-9V, secondary transformer connected in reverse. The output will connected to the load which using lighting bulb ports to measure an record the brightness and lumen in a small room capacity with $6m^2$ for 220-230V and 18W-24W types of bulb.

DEDICATION

First of all I am so grateful that were able to finish this project on time . I would like to thank every single individual who helped us to complete this project directly or indirectly. Most importantly I would like to thank Puan. Nurul Ashikin Binti Mohd Rais who is my supervisor of this project for his guidance and teaching in every phase of this project until we finished this project. Besides that, I would also like to thank each and every single friend who helped us to finish this project and also for their support and encouragement until we finish this final year project. I also wanted to apologise for any mistakes or deficiency in finishing this project. Finally I would also like to thank my parents who being there all the time when we need financial support until we finish this project and also for all the advice given to me.

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LIST OF SYMBOLS

m	-	metre
F	-	Force
V	-	Volt
W	-	Watt
F	-	Farad
P	-	Power
Cp	-	Power Co-efficient
T	-	Torque

LIST OF ABBREVIATIONS

VAWT	Vertical Axis Wind Turbine
HAWT	Horizontal Axids Wind Turbine
LED	Light Emitting Diode
CFL	Compact Fluorescent Lamp
DC	Direct Current
AC	Alternating Current
MOSFET	Metal-Oxide Semiconductor Field Effect
TNB	Tenaga Nasional berhad
PVC	Polyvinyl Chloride

LIST OF PUBLICATIONS

CHAPTER 1

INTRODUCTION

1.1 Background

Wind is shaped by the inconsistent warming of the outside of the Earth from the sun. Sustainable power assets, for example solar, wind, tidal, geothermal and biomass are few. Because of its wide availability the wind power is among the best candidates. The wind energy is one of the non-conventional form. Because of quick vehicles, and furthermore from irrelevant wind, there is a practically steady wellspring of wind power out and about. The force can be made with the guide of different wind turbine types. Wind turbines are transforming the active energy in wind into sustainable power. At the point when the wind turns the sharp edges of the wind turbine, the wind's kinetic energy is caught by a rotor and changed over into revolving movement to drive the generator. Some turbines have automated speed-governing systems to ensure that the rotor does not spin out of balance in very high winds. By the way, the wind turbines also don't need any transport fuel that can be harmful to the environment to produce clean energy.

There are 2 main wind turbine types. Those are Wind turbine Horizontal axis Horizontal axis (HAWT) and Wind turbine Vertical axis (VAWT). Horizontal axis have three-bladed large, with the tower's blades upwind producing the world's over-helming power today. Such turbines have a primary rotor shaft and electric generator at the highest point of pinnacle are pointed towards the ocean. Turbine size and height rise year by year (Resources *et al.*, 2009). As we can see on the Vertical axis wind turbine, then main shaft of the rotor is arranged vertically. The advantage on a site where the direction of the wind is highly variable, but this design produces much less energy over time. There are various types of vertical axis wind turbines. Those are Savonius, Darrieus, and Giromill, which included major variations in torque during each revolution and large bending moments in the blades (Resources *et al.*, 2009).