UNIVERSITI TEKNIKAL MALAYSIA MELAKA

VERTICAL AXES WIND TURBINE POWER SOURCE FOR CAMPUS AREA WITH IOT

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Engineering Technology Computer (Computer System) with Honours.

by

YOGESVARAN CHANDRASAKARAN

B071610802

951001-08-5303

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

TECHNOLOGY

2019

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: VERTICAL AXES WIND TURBINE POWER SOURCE FOR CAMPUS AREA WITH IOT

Sesi Pengajian: 2019

Saya **YOGESVARAN A/L CHANDRASAKARAN** mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (X)

☐	SULIT*	Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam

AKTA RAHSIA RASMI 1972.

☐ TERHAD* Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan.

☒ TIDAK TERHAD

Yang benar,	Disahkan oleh penyelia:
....	....
YOGESVARAN CHANDRASAKARAN	PN AZIEAN MOHD AZIZE
Alamat Tetap:	Cop Rasmi Penyelia
NO.115,	
JALAN TAWAS BARU UTARA,	
TAMAN EHSAN, 30010	
IPOH, PERAK	
Tarikh: 14 / 12 / 2019	Tarikh:

*Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini

DECLARATION

I hereby, declared this report entitled VERTICAL AXES WIND TURBINE POWER SOURCE FOR CAMPUS AREA WITH IOT is the results of my own research except as cited in references.

Signature: ……………………………………

Author : YOGESVARAN A/L CHANDRASAKARAN

Date: 14 / 12 / 2019

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 Electronic Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

Signature: ……………………………………………….

Supervisor : PN AZIEAN MOHD AZIZE

Signature: ……………………………………………….

Co-supervisor: PN ZAHARIAH BINTI MANAP

ABSTRAK

Sumber Kuasa Turbin Angin Menegak (VAWT) Sumber Kuasa untuk kawasan Kampus dengan sistem IoT adalah satu projek menjimatkan kos yang dapat membantu menyelesaikan masalah asas dan keperluan pelajar semasa mereka menunggu di perhentian bas untuk ketibaan bas. Matlamat reka bentuk projek ini adalah untuk menghasilkan turbin angin yang menangkap daya seret angin dari kenderaan di jalan raya, dan juga dari angin nominal. Skop pengguna yang dipertimbangkan untuk projek ini adalah kepada orang yang menggunakan stesen bas terutamanya pelajar. Tujuan projek ini adalah untuk mewujudkan turbin angin yang menghasilkan kuasa dari kenderaan yang dilalui olehnya, dan juga dari angin nominal, yang kemudiannya disimpan dalam bateri motor 12v, kemudian kuasa dipindahkan ke lampu, kipas dan pin USB untuk digunakan oleh pengguna. Selain itu, produk ini akan dihasilkan secara selamat untuk kesihatan, ringan dan bahan tahan cuaca. Apabila daya drag menyentuh bilah, bilah, yang dipasang pada pemutar penjana DC, berputar dan kuasa dihasilkan oleh motor. Penjana DC kemudian menjana tenaga elektrik dari tenaga kinetik bilah berputar, yang kemudian dipindahkan ke bateri asid plumbum (12V) untuk dikenakan. Sekiranya caj penuh, fius akan memotong pengecasan untuk mengelakkan bateri ditanggung berlebihan. Pengatur voltan disambungkan ke bateri dan pin wanita USB disambungkan kepada pengatur voltan. Tambahan, 12V kipas dan lampu 12V disertakan dalam litar ini dengan suis. Jadi pelajar boleh berada pada cahaya pada waktu yang tidak lama dan pada kipas apabila mereka diperlukan semasa menunggu bas. Ini akan mengurangkan kos elektrik UTeM dan membantu pelajar sekali.

ABSTRACT

Vertical Axes Wind Turbine (VAWT) Power Source For Campus area with IoT system is one save cost project that can help solve basic problem and needs of students while they wait at bus stop for bus arrivals. 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 people who uses bus station that locates the wind turbine, especially students. 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 bulb, fan and USB pin to be used by the users. Besides, the product will be manufactured in safety for health, light weight and weatherproof material. 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 DC generator then generates electrical energy from the kinetic energy of the rotating blades, which then transferred to the lead-acid (12V) battery to be charged. If the charge is full, the fuse will cut off the charging to prevent the battery to be overcharged. A voltage regulator is connected to the battery and a USB female pin is connected to the voltage regulator. If the USB port is used, the voltage regulator will reduce the input voltage from the battery to the output voltage 5V to prevent overcharging the USB appliances and causing overheating. To charge a phone, it only takes 5V to charge its battery. Hence voltage regulator is necessary to be connected to the USB pin to control the voltage. In additional, 12V fan and 12V lamp included in this project. So students can turn on and off the light at nigth time and on

fan when they needed while waiting for bus. This will cut cost of UTeM electric bills in small ratio and help student as well

DEDICATION

To my beloved parents, thanks for the help, concern and understanding while I'm in developing this project.

ACKNOWLEDGEMENTS

Thank you God because of His blessing, I finally complete and finish my final year project successfully.

During the process to complete my project objective, I do a lot of research either by using internet, reading past year thesis, reference books and journal. With the guidance and support from peoples around me, I finally complete the project due to the time given. Here, I want to give credit to those who helped me to achieve what I had achieved in my final year project.

First and foremost, I would like to express my deep sense of gratitude and acknowledgement to my supervisor Madam Aziean Binti Muhd Azize for her timely guidance, advices, valuable and constructive suggestions during the planning and developing of this project. In addition thanks for her support and encouragement throughout this final year project. Other than that, I would like to thank my friends Thevand Ravendra and Dinneshiny for their support and help in order for me to successfully complete this project. I would like to show appreciation everyone who is involved in this project either directly or indirectly for their helps and co-operation, and also to my family. Without their support, I would not have been able to finish my final year project.

TABLE OF CONTENTS

LIST OF TABLE

LIST OF FIGURES

LIST OF APPENDICES

LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynold number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle

LIST OF ABBREVIATIONS

PCA	Principal Component Analysis

LIST OF PUBLICATIONS

CHAPTER 1

INTRODUCTION

1.0 Introduction

In this chapter the overview of the project will be briefly discussed. This chapter also emphasizes the problem statement, objectives of the project, scope, and the organization of the whole report.

1.1 Background

Wind is created by the unequal heating of the Earth's surface by the sun. The energy produced by this blowing wind is called as wind energy. The wind energy is one of the non-conventional forms of energy and it is available in affluence. There is a near constant source of wind power on the road due to rapidly moving vehicles. The electricity can be generated with the help of different types of wind turbine. Wind turbines convert the kinetic energy in wind into clean electricity. When the wind spins the wind turbine's blades, a rotor captures the kinetic energy of the wind and converts it into rotary motion to drive the generator. Most turbines have automatic over speed-governing systems to keep the rotor from spinning out of control in very high winds.

Aware of the utilization benefits of wind energy, Malaysia government conducted a demonstration project of wind turbine installation in Terumbu Layang with energy capacity of 150 kW(Sopian, Razali, & Hj.Othman, 1995). Wind energy has a great prospect in tourist resort islands which are currently using their own diesel generators. The state government of Terengganu joint with Tenaga Nasional Berhad

(TNB) embarked on first solar-wind-diesel hybrid power plant project with combined capacity of 650 kW to supply Perhentian Island. The project is integrated of 2×100kW wind turbines, 100kW solar energy and 200kW and 150kW diesel generators. The system also comprises back up batteries with capacity of 480kWh to store up the power. The project is considered as the first of its kind in Asia. So, the installation wind energy system on campus is a great way for Malaysia's colleges and universities to lead the transition to future of 100% clean, renewable energy.

The aim of this project is features of a design a low cost wind turbine which can solve daily life problems, considering environmental issues, safety, and proper research on physics to achieve a better outcome or solution for the problems. Other than that, an analysis of physics behind the wind turbine and the power generation to determine an ideal outcome of generated power and the efficiency of the wind turbine was made in this project.

The result from this project shows that the vertical axes wind turbine can provide enough of power source to student charge their phones, use lamp and fan when they needed. The result is used to analyze the performance of the vertical axes wind turbine when place in UTeM bus stops. This project also uses renewable energy as power source for itself and provide to others.

1.2 Problem Statement

Wind energy is facing quite many challenges as there are many factors need to be considered in order to provide a successfully operating, power supplying wind turbine units, such as the high cost of developing a wind turbine unit which can mostly