UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOP AND DESIGN PORTABLE MINI TURBINE AND SOLAR BACKUP SOURCE FOR OUTDOOR USAGE

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

by

STUDENT NAME MOHAMMAD ZULFADHLI BIN RAMSAH
MATRIX NUMBER B071410722
IC NUMBER 920807-12-5915

FACULTY OF ENGINEERING TECHNOLOGY

2017

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **DEVELOP AND DESIGN PORTABLE MINI TURBINE AND SOLAR BACKUP SOURCE FOR OUTDOOR USAGE**

SESI PENGAJIAN: **2017/18 Semester 1**

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Alamat Tetap:
Blok 13 Lot14 Lorong 11 Taman
Rajawali 90500, Sandakan
Sabah

Tarikh: 19-1-18

Cop Rasmi: SHAHRUDIN BIN ZAKARIA
Pensyarah
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I hereby, declared this report entitled "DEVELOP AND DESIGN PORTABLE MINI TURBINE AND SOLAR BACKUP SOURCE FOR OUTDOOR USAGE" is the results of my own research except as cited in references.

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Date : 19-1-2018

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Power) with Honours. The member of the supervisory is as follow:

SHAHRUDIN ZAKARIA
(Project Supervisor)

ABSTRAK

Tujuan sebenar dalam untuk projek ini ialah membangunkan dan membuat reka bentuk mini turbin mudah alih untuk kegunaan aktitivi luar. Kepada penjalan kaki yang mendaki gunung mereka sukar untuk mendapatkan punca kuasa semasa pendakian. Oleh itu projek ini boleh mengatasi masalah tersebut dengan menggunakan sumber alam semula jadi iaitu punca air, angin dan sinaran matahari . pada masa kini generator mempunyai saiz yang agak besar dan berat untuk dibawa.projek ini mempunya reka bentuk yang kompak dimana ia berbeza dengan reka bentuk generator masa kini. Genarator juga memerlukan bahan api untuk menghasilkan kuasa elektrik dimana penjalan kaki perlu membawa bahan api tersebut ini juga menyebabkan kos untuk menghasilkan kuasa elektrik. Oleh itu projek ini hanya menggunakan sumber alam semula jadi sebagai contoh sungai, angin dan sinaran matahari yang boleh menjana kuasa elektrik. Objektif projek ini juga menggalakan teknologi hijau.

ABSTRACT

The main purpose of this project is to design and develop and (and also) design portable mini turbine for outdoor usage. The hikers cannot get enough energy resource to be use(used) on the electronic device for a long journey. Therefore, this project can overcome problem face (faced) by using nature resources such as hydro and wind. Nowadays, generators have a big size and heavy to carry it (to be carried). (That – to be cut) for this project has a compact design compare the generator design before. A generator also need a fuel to generate an electric source that a traveller must to bring it (must bring it) and make it more costing for (to) generate (an - to be cut) electricity. For this project just usefully a nature source like a river, wind and solar that can generate electricity. The objective of this project is to promote a usage green technology.

DEDICATION

To my beloved parents and friends

Appreciation for their support and understanding

ACKNOWLEDGEMENT

In the Name of Allah S.W.T, the most beneficent, the most merciful

Praise be to Allah S.W.T for giving me the strength to complete my Final Year project 2 (FYP2) and writing the report without any major obstacles. I would like to thank you to my supervisor Encik Shahrudin bin Zakaria who has contributed to this project by giving comments, ideas, suggestion and correction in completing this project. This project is dedicated to my beloved parents and friend who given the all moral support. My sincerest thanks again to all of yout because given me help when needed.

A special appreciation to UTeM, especially the Faculty of the Engineering Technology for giving me chance to participate in this project paper. This project has really helped me understand the mini turbine and solar. I really hope this knowledge will help me for my future work. Finally, I would also like acknowledge the assistance of my colleagues and the other person involved ibt the completion of this research and preparation of this report writing

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Al	-	Aluminium
ANOVA	-	Analysis of Variance
ASEAN	-	Association of Southeast Asian Nations
AT	-	Annual Turnover
Cl	-	Chlorine
F	-	F Test (ANOVA)
FMM	-	Federation of Malaysian Manufacturers
HU	-	Highly Used
IT	-	Information Technology
LU	-	Least Used
M	-	Million
MITC	-	Melaka International Trade Centre
MNC	-	Multinational Company
MU	-	Moderately Used
NOYP	-	Number of Years in Operations
NOE	-	Number of Employees
NU	-	Not Used
PP	-	Polypropylene
PCL/TPS	-	Polycaprolactone/Thermoplastic Starch Blend
RM	-	Malaysian Ringgit
SD	-	Standard Deviations
SME	-	Small Medium Enterprise
U	-	U Test (Mann Whitney Test)
>	-	More than
σ	-	Stress
ϵ	-	Strain
τ	-	Torque

CHAPTER 1
INTRODUCTION

1.0 Introduction

The main purpose of this project is to design and develop and design portable mini turbine and storage the charge for outdoor usage. The hikers cannot get enough energy resource to be use on the electronic device for a long journey. Therefore, this project can overcome problem face by using nature resources such as hydro and wind. Nowadays, generators have a big size and heavy to carry it. That for this project has a compact design compare the generator design before. A generator also need a fuel to generate an electric source that a traveler must to bring it and make it more costing for generate an electricity. For this project just usefully a nature source like a river, wind and solar that can generate electricity. The objective of this project is to promote a usage green technology.

1.1 Project briefing

The main purpose of this project is to design and develop and design portable mini turbine for outdoor usage. The hikers cannot get enough energy resource to be use on the electronic device for a long journey. Therefore, this project can overcome problem face by using nature resources such as hydro and wind. Nowadays, generators have a big size and heavy to carry it. That for this project has a compact design compare the generator design before. A generator also need a fuel to generate an electric source that a traveller must to bring it and make it more costing for generate an electricity. For this project

just usefully a nature source like a river, wind and solar that can generate electricity. The objective of this project is to promote a usage green technology.

1.2 Problem statement and project objective

The hikers can't get any electricity source for there on gadget for example mobile phone, camera, gps (global position satellite), torchlight and etc. A generator is to heavy and difficult to bring and need a fuel (petrol or diesel) to generate it. Furthermore, in middle of journey hard to get fuel.

1.2.1 Problem statement

a) The hikers can't get any electricity source for there on gadget for example hand phone, camera, gps (global position satellite) , torchlight and etc.
b) A generator is to heavy and difficult to bring and need a fuel (petrol or diesel) to generate it. Furthermore, in middle of journey hard to get fuel.

1.2.2 Project objective

a) User can to charge their gadget during the activity by using a renewable source.
b) Design a changeable blade that using same generator.
c) Switching a source to charge the battery by using a solar or generator.
d) User can charge their gadget devices from the storage battery.

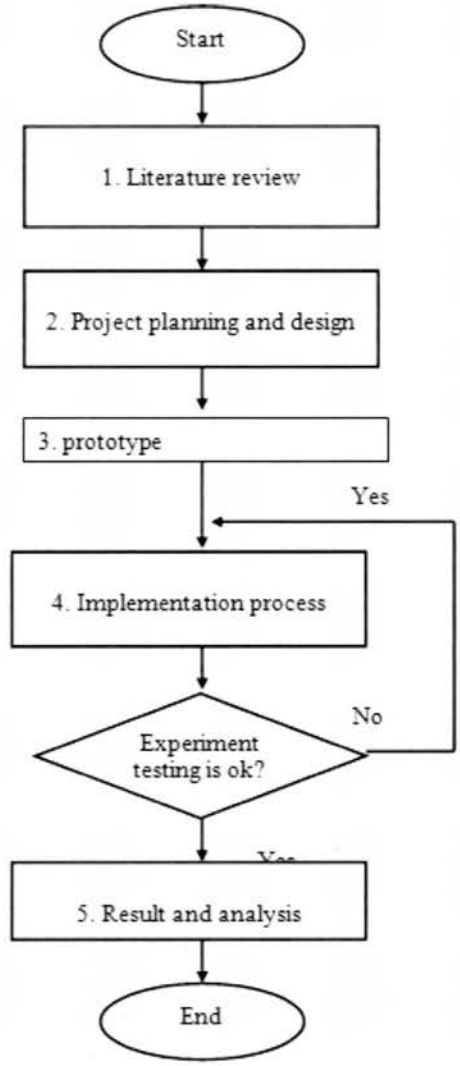
1.3 Work scope

The aim of this project is to design and develop a portable mini turbine

a) Literature about structure of mini turbine

b) Using a nature source to generate an electricity that using wind, river and solar. That so no need using fuel.

1.4 Project methodology



1. Find and collect information from any reliable source for this project.
2. To ensure this project run without any problem palnning and design must be organizing wisely to avoid any problem during implementation process.

3. Build a prototype by using a chosen hardware.
4. Implementation process is the last process before testing. Software and hardware have to combine together to complete this project.
5. All the result will be recorded to make an analysis.

1.5 Result expectation

The expected result of this project is:

a) A mini turbine can help the hikers or outdoor usage to get a enough electric source

b) Have a good output power and efficiency by using nature sources

   a. The solar panel can backup source in case for emergency condition

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This chapter will discuss about of the project which is use a renewable energy and generate electricity by using a nature. Nowadays fuel or other source that we use in this century someday its will be depleted for accidentally to promote a green technology. This project also develops and design a mini turbine to usually for other future.

2.2 Wind energy

Wind control is developing rapidly on both European and overall levels. Over the span of late years, the overall presented utmost of wind control extended from around 2.5 GW in 1992 to somewhat more than 94 GW toward the complete of 2007, an ordinary yearly improvement of more than 25 for every penny. Owing to constant overhauls in turbine capability and higher fuel costs, wind control is winding up clearly fiscally forceful with standard power creation, and at areas with high contort speeds shore wards, wind control is believed to be totally business. The wander and cost structures of land-based and toward the ocean turbines are discussed. The cost of energy conveyed is moreover watched out for, which considers the lifetime of turbines and O&M costs, and the past and future progression of the costs of wind-made power s inspected. In subsequent parts, the centrality of store, reinforce plans and business ssues are discussed. Finally, the cost of wind delivered control is diverged from the cost of consistent non-sustainable power source let go control plants.

2.2.1Types of Wind Turbine Design

Wind turbines are classified into two general sorts: horizontal axis and vertical axis. A vertical axis machine has its blades rotating on an axis perpendicular to the ground. A horizontal axis machine has its blades rotating on an axis parallel to the ground. There are a number of available designs for both and each type has certain advantages and disadvantages. However, compared with the horizontal axis type, very few vertical axis machines are available commercially.

2.2.2 Types of Blades Design

The edge material takes an imperative thought in outline since it can influence the effectiveness of energy era. In view of the (Sharma, 2012) and (Widened and Ghatge, 2013), the perfect material for edges is wood since it is extremely solid, simple to cut, modest, and it is keep from weariness splitting. Another than that, the absolute best edges materials are Fiberglas in light of the fact that it is sufficiently solid and are normal in business windmills yet the form making procedure would take longer time contrasted with pine for an arrangement of sharp edges from wood. There have different materials are appropriate to use in little turbine. The PVC sharp edges are light in weight and simple to introduce however appropriate for little wind turbine. Ultimately, aluminum combination sharp edges are not by any means basic for little wind turbine. It is utilized for just 1kW to 5kW wind turbine. The outline of sharp edge that appropriate inherent roadway is the c-sort edge as expressed by (Ayyadurai, Palani, and Prem, 2013). This sort of plans ready to catch most extreme pneumatic force and can have greatest vitality change over from constrained twist vitality to rotational mechanical vitality.

2.2.2.1 Stall to pitch control

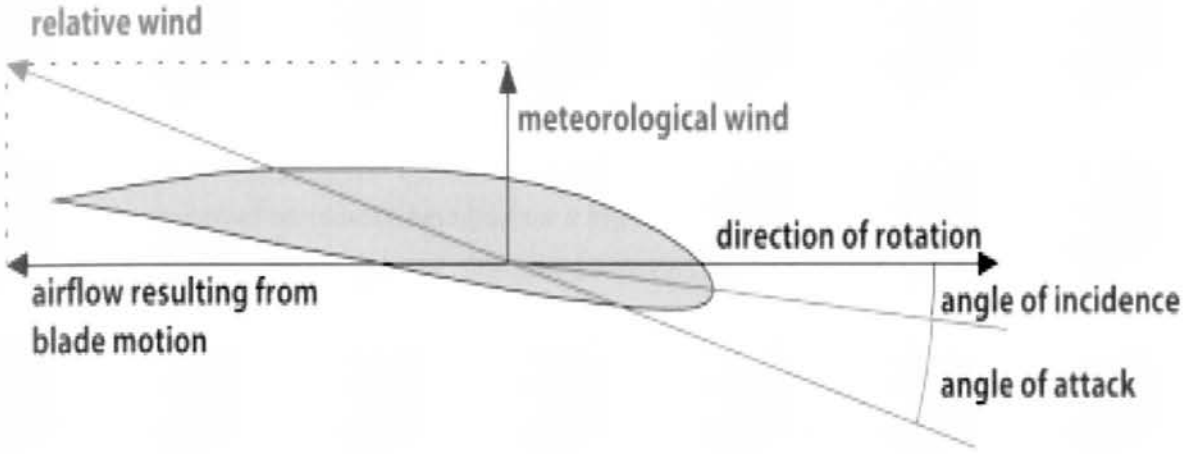


Figure 2.2.2.1.1 attacking the angle between the relative wind and the chord line with

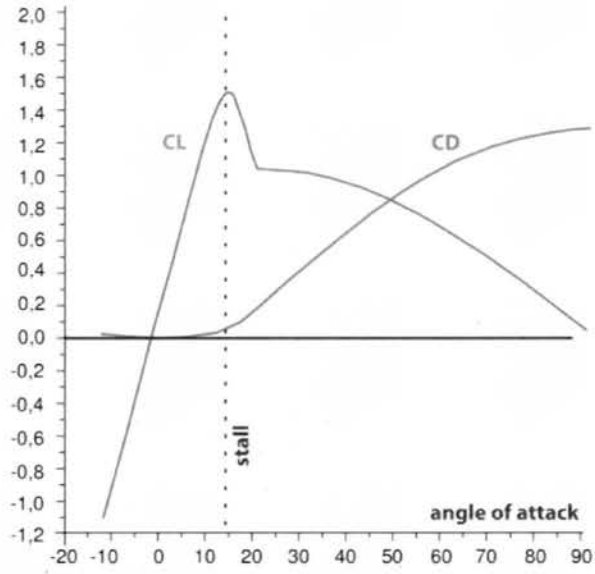


Figure 2.2.2.1.2 forces of lift and dragging at rotor blade vary with the angle of attack.

Wind turbines rely on upon the streamlined "slow down" of their rotor cutting edges to control. At the point when the wind stream hits the harmony line of a rotor cutting edge precisely from the front, the approach is zero and the edge does practically no work. In a perfect world, the relative wind approaches more from underneath, with an approach of around 8 degrees. This outcome in a lift compel substantially bigger than de air resistance (drag) of the sharp edge, with a segment in the rotor's bearing of revolution. At higher wind speed and generally consistent cycles every moment, both approach and lift constrain increment, bringing on a higher power yield. Past around 15 degrees the sharp edge will slow down. The drag keeps on expanding, however the lift compel drops, which restrains the ability to a sheltered esteem. Snell: A working point near the slowdown is not all that awful in a few regards. Varieties in the approach don't change the powers on the rotor in particular, in that locale. In any case, those strengths will as of now be expansive. Furthermore, the route in which the wind stream withdraws amid the slowdown is a fairly eccentric process, with varieties in time, bringing about cyclic burdens. So far, slow down power control has just been utilized for twist turbines up to around two megawatts. Bigger turbines are pitch controlled; the cutting edges are persistently changed in accordance with keep the power inside tight cutoff points, and the approach stays well outside the slowdown district.

2.2.3 Synthetic jets

What's required is a consistent change of the lift constrain, without changing the point of occurrence for the whole edge. Folds on the trailing edge (frequently called ailerons) could do it, however would be somewhat powerless and hard to keep up. Together with the University of Twente ECN is taking a shot at manufactured planes; each being a depression containing a swaying stomach and having little openings in the upper and lower skin of the cutting edge, close to the trailing edge. Amplifiers are utilized as a part of the model which is right now being tried in a wind burrow. They work at a full recurrence of the hole, making air be sucked in on one side while being removed at the opposite side, around 100 times each second. To diminish the lift compel, air is extinguished on the upper side of the sharp edge; coordinating the fly

downwards causes an expansion. The stream should obviously be precisely controlled, and that requires sensors.

2.2.4 Fatigue loads

This implies less turbulence diminishes the heap on the rotor sharp edges, at any rate all things considered. Be that as it may, there is likewise an impediment. The thin cutting edges of a huge wind turbine are to a great degree delicate to varieties in the wind stream, particularly at little approaches. A change of one degree may adjust the lift drive by a few tons, bringing about serious bowing weights on the edge roots. Snel: "Pitch control per singular cutting edge is sufficient to counter contrasts which happen once per upheaval, similar to the plunge in the twisting burden brought about by going before the tower. In any case, the speedier varieties additionally contain a lot of vitality. Furthermore, the present pitch control frameworks aren't sufficiently quick to deal with them."

2.2.5 Cheap and effective

There might be an exquisite arrangement: weight sensors in the main edge of the sharp edge, to gauge the weight contrast between the lower and upper sides," says Snel. "Changes in the approach could be precisely gotten from their information, permitting the product controlling the planes to repay very quickly." Engineered planes are mechanically basic and require next to no vitality. In this application their openings would be near the trailing edge of the rotor sharp edge, where ice is probably not going to bring about inconvenience; they ought to work dependably. The (little) openings for the weight sensors will probably experience the ill effects of ice and earth, however: "The product would see that a could without much of a stretch clean them utilizing air pressurized by the rotor itself - the empty sharp edges enable it to fill in as a colossal diffusive pump. The system accuracy and reliability can be further improved by