UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF PORTABLE SOLAR POWERED FOR RURAL APPLICATION

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

by

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: DEVELOPMENT OF PORTABLE SOLAR POWERED FOR RURAL APPLICATION

Sesi Pengajian: 2019

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: Development of Portable Solar Powered For Rural Application

SESI PENGAJIAN: 2018/19 Semester 1

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I hereby, declared this report entitled DEVELOPMENT OF PORTABLE SOLAR POWERED FOR RURAL APPLICATION is the results of my own research except as cited in references.

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Author : NAIF FAHMI BIN AHMAD NAFIS

Date: ……

APPROVAL

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

Signature: …….

Supervisor : Mrs Emy Zairah Binti Ahmad

ABSTRAK

Kini, kenaikan kos bahan api fosil dan ancaman kesan rumah hijau memanaskan global dalam satu dekad yang lalu. Oleh itu, pelbagai sumber tenaga boleh diperbaharui semakin meningkat naik dalam menjana kuasa. Tenaga solar tenaga yang banyak yang tidak pernah habis menjadi sangat penting bagi seluruh dunia bergantung pada iklim atau cuaca di setiap negara. Malaysia yang terletak di Asia adalah salah satu negara yang berpotensi menggunakan sinar matahari atau tenaga suria sebagai tenaga elektrik kerana iklim panas setiap tahun. Matlamat projek ini adalah membangunkan sistem kuasa solar mudah alih yang berkesan dan mesra alam untuk aplikasi luar bandar. Projek ini adalah mengenai bekalan sandaran terutamanya bagi orang yang hidup dalam kekurangan elektrik sebagai pengganti penjana gas. Oleh itu, projek ini mudah alih yang mudah dipindahkan dan bukan sahaja untuk peralatan elektrik rumah. Tambahan lagi, kuasa solar mudah alih juga boleh dibawa ke berkelah dan dicipta sebagai persediaan untuk kes kecemasan. Projek ini direka untuk membekalkan keperluan elektrik DC dan keperluan elektrik AC 220V juga. Tenaga solar mudah alih telah dibangunkan untuk keperluan komuniti dan dipercayai untuk membantu komuniti dalam keadaan kecemasan.

ABSTRACT

Nowadays, the rising cost of fossil fuels and the threat of greenhouse effect warm the global in a last decade. In consequently, varies of renewable energy source are increasingly important in generate power. Solar energy is abundant energy which is never run out becomes so important for worldwide depends on the climate or weather in each country. Malaysia that placed in Asia is one of the country have high potential use sunlight or solar energy as electrification due to hot climate every year. The aim of this project is develop a portable solar power system which effective and environment friendly for rural application. This project is about a backup supply especially for people who live in lack of electricity as a replacement for gas. Otherwise, this project is portable that easy to move and not only for household electric appliances. In addition, portable solar power also can bring to picnic and as emergency case. This project designed to supply DC load and 220V AC load as well. Portable solar powered has been developed for communities need and believed to help communities in emergency.

DEDICATION

To my beloved parents Mr. Ahmad Nafis Bin Mohd Fahmi and Mrs. Zaini Binti Abdul Ghani for their support and pray. A full appreciation to my supervisor Mrs. Emy Zairah Binti Ahmad for non-stop advising and helping me a lot to get through this project.

Signature : …….

Author's Name: Naïf Fahmi Bin Ahmad Nafis

Date : …….

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GWh	-	Gigawatt hours
Wh	-	Watt hours
W	-	Watt
Persq.	-	Per square
PV	-	Photovoltaic
DC	-	Direct current
AC	-	Alternating current
W/m ^{2}	-	Watt per square metre
MW	-	Megawatt
GHG	-	Greenhouse gas
FIT	-	Feed in tariff's
NEM	-	Net energy metering
TSFC	-	Thin film solar cells
Cdte	-	Cadmium telluride
CIGS	-	Copper indium gallium dieselenide
Wp	-	Watt peak
Vdc	-	Voltage direct current
PWM	-	Pulse width modulation
MPPT	-	Maximum power point tracking
MOSFET	-	Metal-oxide semiconductor field-effect transistor

VR	-	Variable resistor
P	-	Power
V	-	Voltage
I	-	Current
Voc	-	Voltage open circuit
Isc	-	Current short circuit

CHAPTER 1

INTRODUCTION

1.0 Introduction

Nowadays, renewable energy becomes an increasingly important issue due to the rising cost of fossil fuels and the threat of greenhouse effect which increasing led to global warming. Therefore, many type of renewable energy was created to produce electricity without the concern of environment issues. Renewable energy is energy generated by the energy of the environment such as water, wind, sun, waves and geothermal. This energy can reduce pollution that would occur when using non-renewable energy. It can also be a solution to global warming worldwide.

Solar power is one of the most popular renewable energy have the huge potential that can be commercial in Malaysia regarding the location of this country on the equator. It is an advantage which Malaysia receives 12 hours of sunlight daily. In 2010, total of electricity generation in Malaysia 137,909 GWh and between 4,000 to 5,000 Wh persq. m per day. This means Malaysia gets enough energy from the Sun in generate 11 years worth of electricity.

Photovoltaic (PV) solar panel is the main component in solar power system which it is the most common form of solar energy used today. PV solar panel absorbs the sun light and will convert from light directly in direct current (DC) form to create electricity. The term of photovoltaic represents two words; photo refers to the light and voltaic represent the electricity. This solar panel normally attached at homes as

secondary source of electric power as a backup supply. PV solar panel also used for small appliances which provide small amounts of electricity to use in project and others.

1.2 Problem Statement

In 2012, population that lack access of electricity for all country about 25%. It was a percentage of regions population that lives without or lack electricity which is the most of them is in Africa, Asia, Middle East and the least is in Latin America. Usually people at rural areas are still beyond the development or coverage and lives in lack of electricity are nothing pleased for them. As we know electricity is so important nowadays for daily usage. Same problem happen in Malaysia even in advanced country but still many place not develops well especially in rural areas.

Basically, lack of electricity effects the system of studying at school and also daily routine for villagers. According to the villagers, they are forced to use gen-set as a electric supply. We know gas generator which may be bulky, cumbersome and difficult to transport. Generator also burn fossil fuels which are expensive non-renewable. According to (Abdul Majid et al., 2012), they explained about the disadvantages of generator which is needs petrol fuel to generate electric. Besides, generator also requires maintenance and pollutes the environment which increases the global temperature.

Portable solar power is developing through this project since it is easy to transport and the system created as a backup supply for rural areas which is support the latest technology to a new level of innovation. Basically this portable solar is eco-friendly where it's provide supply the AC and DC supply so to solve this problem is develop the portable solar powered.