UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PIEZOELECTRIC GENERATION AT PEDESTRIAN FOR STREET LAMP APPLICATION

AHMAD HANZALAH BIN HANI

BACHELOR OF ELECTRICAL ENGINEERING TECHNOLOGY (Industrial Automation & Robotics) WITH HONOURS

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Faculty of Electrical and Electronic Engineering Technology

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Ahmad Hanzalah bin Hani

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(Industrial Automation & Robotics) With Honours

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A thesis submitted
in fulfillment of the requirements for the degree of
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.....
AHMAD HANZALAH BIN HANI

Alamat Tetap:

Lot 64576, Jalan Tiong,
Kampung Dato' Ahmad Said Tambahan
2, 30020, Ipoh,
Perak.

Tarikh:15/1/2021

Disahkan oleh penyelia:

.....
PN. ROHAINA BINTI JAAFAR

Cop Rasmi Penyelia

ROHAINA BINTI JAAFAR
Juruterа Pengajar
Jabatan Teknologi Kejuruteraan elektrik
Fakulti Teknologi Kejuruteraan elektrik dan elektronik
Universiti Teknikal Malaysia Melaka

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Signature: ……

Author : AHMAD HANZALAH BIN HANI

Date: 15/1/2021

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 Engineering Technology (Industrial Automation and Robotics) With Honours. The member of the supervisory is as follow:

Signature: .....

Supervisor : PN. ROHAINA BINTI JAAFAR

ROHAINA BINTI JAAFAR
Juruterа Pengajar
Jabatan Teknologi Kejuruteraan elektrik
Fakulti Teknologi Kejuruteraan elektrik dan elektronik
Universiti Teknikal Malaysia Melaka

Signature: .....

Co-supervisor: EN ARMAN HADI BIN AZAHAR

ARMAN HADI BIN AZAHAR
Pensyarah
Jabatan Teknologi Kejuruteraan Elektrik
Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik
Universiti Teknikal Malaysia Melaka

ABSTRAK

Tenaga penting untuk kehidupan dan semua makhluk hidup di era globalisasi ini. Ini adalah pilihan dan keputusan dalam tenaga mempengaruhi sistem semula jadi di Bumi. Disebabkan permintaan yang tinggi untuk tenaga elektrik, sumber bahan bakar fosil meningkat bekalan dan harga tenaga meningkat. Tenaga boleh diperbaharui harus digunakan untuk mengurangkan pelepasan gas rumah kaca dan untuk mengurangkan penggunaan bahan bakar fosil. Piezoelektrik adalah sumber penuaian tenaga biasa yang merupakan proses pengekstrakan, penukaran dan penyimpanan tenaga, yang dapat dihasilkan oleh panas, getaran, dan pergerakan. Apabila tekanan diberikan, kesan piezoelektrik akan menukar tenaga mekanikal menjadi tenaga elektrik. Matlamat utama projek ini adalah untuk menyediakan sumber kuasa sandaran seperti itu dan mengisi semula peranti penyimpanan seperti bateri dan kapasitor untuk menyalakan lampu jalan apabila diperlukan. Projek ini juga akan dipasang dan digunakan di pejalan kaki. Eksperimen prototaip projek telah dijalankan menggunakan sambungan litar yang berbeza di mana data dari projek prototaip dianalisis. Hasilnya, ini menunjukkan bahawa output yang menggunakan sambungan selari siri untuk litar lebih tinggi daripada sambungan yang lain. Sistem ini menghasilkan tenaga output purata sekitar 1.75 volt apabila mencapai 73 langkah. Data yang diambil dari sistem prototaip projek kemudian dianalisis, dinilai dan disimpan untuk penambahbaikan selanjutnya. Kesimpulannya, semua objektif untuk Generasi Piezoelektrik di Aplikasi Pedestrian untuk Lampu Jalan telah berjaya dicapai.

ABSTRACT

Energy is important for life and all living things in this era of globalization. It is a choices and decisions in energy affect natural systems on Earth. Throughout modern society 's high demand for electricity, the resources of fossil fuels are rising supplies and the energy prices are growing. Renewable energy should be used to reduce emissions of greenhouse gasses and to reduce the use of fossil fuels. Piezoelectric is a common energy harvesting source that is a process of energy extraction, conversion and storage, which can be produced by heat, vibration, and movement. When pressure is applied, piezoelectric effect will convert mechanical energy to electrical energy. The main goals of this project is to provide such a backup power source and to recharge storage devices such as batteries and capacitors for lighting up the streetlight when needed. This project also will be install and applied at pedestrian. The prototype of the project has undergo an experiment of using a different circuit connection where the data from the prototype project is analyse. As the result, it shows that the output that by using a series parallel connection for the circuit is higher then other connection. This system generate an average output energy around 1.75 volt when it reach 73 step. The retrieved data from the project prototype system is then been analyse, evaluate and kept for further improvements. In conclusion, all the objective for this Piezoelectric Generation at Pedestrian for Street Lamp Application have been successfully achieved.

DEDICATION

I acknowledge my sincere dedication, honors and gratitude to both of my parents Hani bin Yang Kasim and Arbayah binti Zainal for their love, pray, encouragement, supports, and sacrifices throughout whole of my life. Without their sacrifices and encouragement, I cannot possibly reach this stage. Special gratitude also dedicated to all my brothers and sisters which always support and advise me in whatever I do in my life. Special thanks goes to all of lecturers especially my supervisor Puan Rohaina bt Jaafar who has taught and guided me throughout my studies. Not be forgotten, all of my friends who always been with me throughout this joyful journey. There is no words can express my sincere appreciation to all of you.

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Ohm	-	SI unit for electrical resistance
Watt	-	Si unit for power
V	-	SI unit for electromotive force
DC	-	Direct Current
AC	-	Alternate Current
I	-	SI unit for current
M	-	Mass
Gram (g)	-	Metric unit of mass

CHAPTER 1

INTRODUCTION

1.1 Background

Green energy or also known as renewable energy is used to describe sustainable and environmentally friendly sources of energy, such as wind. These sources of energy help to reverse global warming changes caused by fossil fuels. This is a rise in Earth's surface warming. Renewable energy can be produced from a wide variety of natural source such as wind, solar, hydropower, geothermal and biomass. Wind energy is one of the most effective and efficient methods for producing electricity because it does not produce emissions of carbon waste or of global warming. For solar, it only used power from the sun to produce electricity and for hydropower, the moving of the water is used to produce electricity. Furthermore, biomass used organic matter to produce energy.

There are many advantages and benefits for using renewable energy. As example, it will generate electricity that contains no greenhouse gas emissions from fossil fuels and eliminates certain forms of air pollution. Next, it will help with expanding energy sources and reducing reliance on imported fuels. It will also help to reduce the future energy price, because non-renewable energy such as coal, gas and oil are so expensive. There is also