Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF GREEN STOVE PORTABLE BIOMASS POWER SOLUTION BASED ON IOT

MUHAMMAD RIDZWAN BIN AB RAOF

Bachelor of Electronics Engineering Technology with Honours

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A project report submitted
in partial fulfillment of the requirements for the degree of
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Tajuk Projek: Development of Green Stove Portable Biomass Power Solution Based on IoT

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I declare that this project report entitled "Development of Green Stove Portable Biomass Power Solution Based on IoT" is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature	:	
Student Name	:	MUHAMMAD RIDZWAN BIN AB RAOF
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APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honours.

Signature :

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DEDICATION

I committed my endeavour and all my hard work to studies in order to reach my ideal goal of achieving the Dean's List every semester. Not only that, but I dedicated everything to my parents, who have always supported me, as well as to all my family members for being the backbone of my journey to finish my degree with a First-Class result, and to all my lecturers for guiding me and endlessly providing me with the knowledge that I required to complete my project. I would not have been able to complete this with flying colours without the help of everyone. Thank you.

ABSTRACT

Biomass is a renewable organic material that can be produced from organic sources such as animals and plants. Biomass is an essential fuel source in many countries especially for heating purposes such as cooking in underdeveloped countries. As a method of minimising carbon dioxide emissions, there has been a shift from the use of fossil fuels to the use of biomass fuels in many industrialized countries . Biomass stores chemical energy derived from the sun. Photosynthesis produces biomass in plants. Various technologies may convert biomass into sustainable liquid and gaseous fuels, or biomass can be burnt directly for heat. The main purpose of this research is to implement the use of biomass energy into a portable power banks which can be used by everyone and to measure the output power produced by different types of biomass fuels.Various methods have been taken in conducting the research by referring to previous articles and research to further deepen the knowledge about this project. The results for this project are achieved when the green stove prototype can successfully charge electronic devices and can be monitored and controlled through electronic devices such as mobile phones. Different output power should be successfully produced and measured depending on the type of biomass fuels used during the testing. In conclusion, this research project can be learned and used in various industries or daily life as biomass has a lot of uses and benefits.

ABSTRAK

Biojisim ialah bahan organik yang boleh diperbaharui dan diperoleh daripada tumbuh-tumbuhan dan haiwan. Biojisim ialah sumber bahan api penting di banyak negara, terutamanya untuk memasak dan memanaskan di negara yang kurang membangun. Sebagai kaedah meminimumkan pelepasan karbon dioksida daripada penggunaan bahan api fosil, penggunaan bahan api biojisim untuk pengangkutan dan pengeluaran tenaga semakin berkembang di banyak negara perindustrian. Biojisim menyimpan tenaga kimia yang diperoleh daripada matahari. Fotosintesis menghasilkan biojisim dalam tumbuhan. Pelbagai teknologi boleh menukar biojisim kepada bahan api cecair dan gas yang mampan, atau biojisim boleh dibakar terus untuk haba. Tujuan utama penyelidikan ini adalah untuk melaksanakan penggunaan tenaga biojisim ke dalam bank kuasa mudah alih yang boleh digunakan oleh semua orang dan untuk mengukur kuasa keluaran yang dihasilkan oleh pelbagai jenis bahan api biojisim. Pelbagai kaedah telah diambil dalam menjalankan penyelidikan dengan merujuk kepada artikel dan kajian terdahulu untuk mendalami lagi pengetahuan tentang projek ini. Keputusan untuk projek ini dicapai apabila prototaip dapur hijau berjaya mengecas peranti elektronik dan boleh dipantau dan dikawal melalui peranti elektronik seperti telefon bimbit. Kuasa keluaran yang berbeza harus berjaya dihasilkan dan diukur bergantung pada jenis bahan api biojisim yang digunakan semasa ujian. Kesimpulannya, projek penyelidikan ini boleh dipelajari dan digunakan dalam pelbagai industri atau kehidupan seharian memandangkan biojisim mempunyai banyak kegunaan dan faedah.

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CHAPTER 1

INTRODUCTION

1.1 Background

Renewable energy is a natural-type source of energy that can be used for many times without worrying about it depleting as it can be replenished. For example, various types of energy such as wind and solar have been used for a long time to generate electricity for a lot of purposes.

Malaysia also has renewable energies that can be used such as wind, solar and hydro. Solar energy is one of the biggest technologies that is being developed and used in the renewable energy industry in Malaysia. However, other renewable energy such as biomass can also be used as Malaysia is a country that is rich with plants and organisms.

Biomass energy is one of the renewable energies that is not finite and can be replenished. The energy is produced by living or dead organisms such as plants and animals. The process of producing biomass energy started from the energy provided by the Sun for plants through a process called photosynthesis which will be converted to carbon dioxide and water. After that, the energy from these organisms can be burned to produce electrical energy for various uses.

1.2 Problem Statement

Nowadays, power banks are one of the most important products that are needed by a lot of people because of their portability and their functionality to charge electronic and electrical devices. A lot of people love doing outdoor activities such as hiking and camping for days in jungle or mountain areas. They would bring their own power bank to charge their electronic devices so that they can use them everyday without worrying about the battery running out of power.

However, most power banks cannot last for a long time which can be troublesome for outdoor uses especially for hikers or campers. It is very hard to find a power source to charge the power bank when hikers or campers are in the middle of the jungle. This would also cause many problems especially during an emergency.

Therefore, developing a power bank that can use natural sources such as biomass energy to recharge the battery will definitely help especially for hikers and campers that are having trouble finding a power source.

In order to cope with this problem, this project proposes to create a power bank that can use biomass energy to recharge the power bank with IoT and a newly installed automatic night light sensor that can be used as a flashlight during the night.

1.3 Project Objective

The main goal of this project is to come up with a systematic and effective way to make a power bank that can be used for hiking and camping. Specifically, the goals are as follows:

a. To develop an environment-friendly power bank using biomass.

b. To monitor the power bank using Blynk App.

c. To analyse the performance of each source that can help generate more power and electricity

1.4 Scope of Project

To eliminate any confusion about this project as a result of specific limits and constraints, the project's scope is stated as follows:

a) To develop a smart power bank that can sustain without power source .

b) This project is specifically for the long term outdoor uses such as hiking and camping in the jungle.

c) This power bank has a sensor that can detect if it's nighttime or daytime to light up the lamp automatically.

d) The power bank can be monitored through the Blynk app.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In today's contemporary civilization, renewable energy is the key to sustain many types of uses in urban, sub-urban and rural areas because of its massive and unlimited resources. To give an example, biomass is a very adaptable fuel source that may be converted to electrical, gaseous, and liquid fuels. This topic is significant because biomass energy is important for some countries and the usage of biomass is also increasing. For example, Pakistan typically relies on fossil fuels and a little amount of biomass to meet their energy requirements. To meet its current energy demands, Pakistan desperately need advanced conversion technologies such as combustion, gasification, and pyrolysis. These technologies have been successfully implemented in a variety of nations worldwide [1]. Therefore, this project proposes using biomass energy to be converted into electrical energy to supply power for the power bank.

This chapter is focusing on doing more research related to this project from articles, journals and books. The related and relevant theories, models and results based on previous research will be applied to support the effectiveness of this project.

2.2 Biomass energy production

Biomass comes from a variety of sources, including municipal solid waste (MSW), agricultural crops, crop leftovers, and forest residues. The distinct features of biomass in both proximal and final analyses enable the production of dependable energy supplies. Biomass is a versatile fuel source that provides biofuel, which may also be used in transportation, and bioenergy, which can be used to create cleaner, more economical power worldwide [2].

A biomass power plant, which may offer heat and electricity energy, is the most common approach to generate electrical energy from biomass. The typical technique of producing electricity has an efficiency of 30-55 percent, whereas the Combined Heat and Power (CHP) approach has an efficiency of 80-90 percent. The second rule of thermodynamics governs the operation of a CHP power plant.

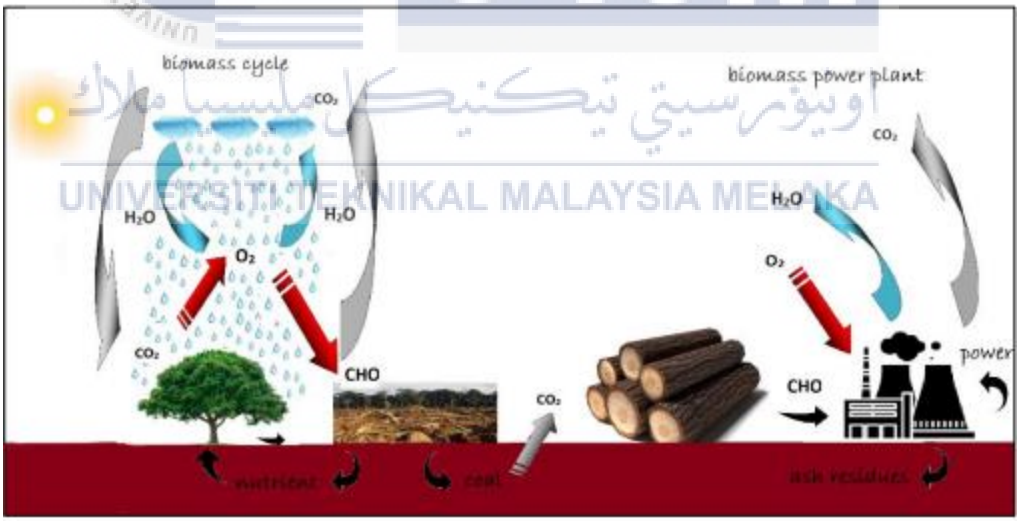

Figure 2.1 Biomass cycle

First, high-energy heat is converted into electricity and thermal energy is converted into heat at a lower temperature. Biomass power plants use a comparable Basic Parallel Process (BPP) in which the efficiency of the steam turbine generators is about 25%, and fuel conveyance frameworks and the standard BPP is around 20 MW in an estimate, with a couple of dedicated wood-let go plants in the 40– 50 MW estimate range.

First, the flowing cold water feeds the exchanger tubes in the combustion chamber housing the heat exchanger. Burning biomass produces hot combustion gases, which are used to raise the pressure in the feed water. The produced steam is collected in the high-pressure boiler in the next step, with the ultimate objective of feeding the steam turbine to flow the steam pressure at a correct pressure point. Following that, the high-pressure steam is directed onto the steam turbine's blades, which spin the turbine shaft. Power may be generated by connecting an electric power generator at the end of the compressor shaft. The generated electricity is equivalent to 30 million kWh, which may be used for a variety of applications. The combined steam must be returned to the heat trade. However, before delivering the cooled off water to the heat exchanger, the continuing heat might be linked to local warming. Every year, around 50 million KWh of electricity may be saved by taking this option, as a consequence of expelling this heat into the environment via smokestacks, which helps to minimize energy waste. As a result, deploying a Combined Heat and Power (CHP) plant results in energy cost reserve funds to decrease heat waste and CO2 emissions. [3].