UNIVERSITI TEKNIKAL MALAYSIA MELAKA

STUDY ON ENERGY CONSUMPTION OF DIFFERENT BLADE SHARPNESS FOR GRASS CUTTER APPLICATION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Electronic Engineering Technology (Automation Industry and Robotics) with Honours.

by

NUR ATHIRAH BINTI ANUAR

B071510493

960923-03-5788

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

TECHNOLOGY

2019

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: STUDY ON ENERGY CONSUMPTION OF DIFFERENT BLADE SHARPNESS FOR GRASS CUTTER APPLICATION

Sesi Pengajian: 2019

Saya **NUR ATHIRAH BINTI ANUAR** 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:

....

NUR ATHIRAH BINTI ANUAR MUSTAFA BIN MANAP

Alamat Tetap: Cop Rasmi Penyelia

NO338,TAMAN MANJUNG POINT 4/6,

MANJUNG POINT SEKSYEN 4,

32040 SRI MANJUNG,

PERAK

Tarikh: 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 STUDY ON ENERGY CONSUMPTION OF DIFFERENT BLADE SHARPNESS FOR GRASS CUTTER APPLICATION is the results of my own research except as cited in references.

Signature: ……

Author : NUR ATHIRAH BINTI ANUAR

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 (Automation Industry and Robotics) with Honours. The member of the supervisory is as follow:

Signature: …….

Supervisor : MUSTAFA BIN MANAP

ABSTRAK

Kajian Penggunaan Tenaga Ketajaman Bilah Yang Berbeza untuk Aplikasi Pemotong Rumput adalah projek yang menggunakan pengesanan meter tenaga untuk pemotong rumput melalui sensor arus dan voltan. Sistem ini menyelesaikan masalah untuk meningkatkan mutu pemotongan dan mengurangkan penggunaan tenaga untuk mana-mana pemotongan pemotong rumput. Objektifnya adalah untuk menjadikan jangka hayat pemotong rumput lebih lama dengan menyiasat apa hubungan penggunaan kuasa dari pemotong rumput untuk jangka hayat. Sensor arus dan voltan akan merasakan penggunaan penggunaan kuasa dengan bahan memotong yang berbeza dan jenis bateri yang berlainan. Data dari sensor akan dikumpulkan dan disimpan di platform IoT iaitu ThinkSpeak semasa proses pemotongan. Data yang diukur dapat direkod dan menunjukkan bahawa dengan menggunakan bilah keluli pengunaan kuasa adalah tinggi dari pisau nilon dan penggunaan bateri Li-Po lebih baik dari Li-Ion.

ABSTRACT

Study on Energy Consumption of Different Blade Sharpness for Grass Cutter Application is a project using application of energy meter detection for grass cutter via current and voltage sensor. The system solve the problem to improve cutting quality and reduce the energy consumption for any grass cutter cutting process.. The objective is to make the life expectancy of the grass cutter is longer by investigate what the relationship the use of power from grass cutter for its life expectancy .The current and voltage sensor will sense the use of power consumption with different cutting material and different type of battery . The data from the sensors will be collect and store at IoT platform which is ThinkSpeak during cutting process. The measured data was record and show that, the steel blade consume high power consumption than nylon blade and the use of Li-Po battery is better than Li-Ion.

DEDICATION

My beloved parents Anuar Bin Nordin and Zura Binti Mat Jusuh. To my brother Muhammad Afiq Zakwan Bin Anuar. A big appreciate to my supervisor, Sir Mustafa Bin Manap , My Final Yeatr Project Panel , Madam Madiha Binti Zahari, my lecturers, my friends, Fatin Najwa Binti Zakaria , Nur Amalina Binti Mohmad Bakari dan Nur Amirah Binti Abdullah and all my friends and thank you for your idea and support so that the report can be completed successfully. Thank you for encouragement and support until I have finish completing my final year project. I am grateful too for the support and advice from my faculty‟s library for provides meticulous research and sources to expand my project knowledge.

ACKNOWLEDGEMENTS

Assalamualaikum w.b.t, in the name of Allah S.W.T, firstly I would like to praise to Allah s.w.t whose blessing and guidance have helped my through the entire research programme. Peace be upon our Prophet Muhammad s.a.w who has given light to mankind.

First of all, I take this opportunity to express my greatest gratitude to the people and express my special appreciation is given to my supervisor, Sir Mustafa Bin Manap for their continuous guidance, suggestions, encouragement and advises in making this research a success.

My appreciation also goes to my friends for their advice, supervision, and crucial contribution, which made them a backbone of this project to become successfully. Thank you for lending hands during progress of the project.

Finally, I also would like to express my exceptional thanks to my beloved parents who encourage me and gave fully support and unending prayers, guidance and helps me directly or indirectly in successful finishing of my final year project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF SYMBOLS

I	-	Current
V	-	Voltage
P	-	Power
E	-	Energy

LIST OF ABBREVIATIONS

Li-Ion	Lithium Ion
Li-Po	Lithium Polymer
LCD	Liquid Crystal Display
SD	Secure Digital
PIR	Passive Infrared Sensor
IR	Infrared
ESC	Electronic Speed Control
IoT	Internet of Things
CAD	Computer Aided Design
CAE	Computer Aided Engineering

CHAPTER 1

INTRODUCTION

1.1 Background

Most of electrical appliance receive energy from a power source in the form of electric current but cordless electrical appliance derive the energy required for their operation from batteries. Many battery capacity of cordless electrical appliance is limited due to constraints on dimension and weight of the device. This implies that electricity efficiency of these appliance is very important to their usability. Many electrical appliance functionality is increasing rapidly due to arise of technology and requirement of client. Hence , optimal management of power consumption of these electrical appliances become critical and that become one of the factor of shorten the battery expectancy(Carroll, 2016).

Based on the information of the power management and activity states of hardware components on power system. Some designers of electrical appliance company corporates power-saving features, enabling element to dynamically alter their power consumptions based on required situation. However, the electrical appliance builders need to understand the implications of their design decisions toward utilization of this function wisely. Users will use appliance by only depends on power-saving features for long battery lifespans without know the real amount of power or the level of power consumption(Zhang et al., 2014).

Modern electronic devices provide a lot of new functionality that benefit to users. Portable handheld electrical appliances that use the battery can connect and transfer information with other device whether using wired or new trending now wireless data

links , can display information on display screens, can receive instructions from a user and process fastest digital data speeds that were unthinkable. New functionality is implemented using other integrated circuits that coordinate the operation of these and other hardware components. User will be provided with feedback regarding power consumption in a battery-operated electronic device(Power and In, 2013).

1.2 Problem Statement

Many of agricultural lands are needed for their herbaceous plants as a source of food for animal .But, the first problem is how to optimize the performance of mowers that farmers use, by means the cutting quality of single circular disc mower produce. The level of blade sharpness and energy consumption is main point to improve the cutting quality of the mowers(Hosseini and Shamsi, 2012) .

Currently, agricultural industry have seen catch up the pace of modernization, which make mechanization of agricultural production increased. Due to this, the second problem is how to minimizing the use of energy consumption of harvesting machinery. The sharpness of cutting blade is a main key working parts of a corn harvester, which is the resistance and power consumption depends on it(Tian *et al.*, 2017).

1.3 Objective

The specific objective of this work to:

1. Investigate how the use of power from cordless grass cutter affect to the life expectancy of battery.
2. Study the relationship between sharpness of blade and energy consumption of battery.
3. Increase portable grass cutter durability by reducing battery consumption

1.4 Scope

The scope of this project understanding the overview concept of grass cutter, because this project study about energy consumption for the use of cordless grass cutter.

1. The circuit will be generate by 3 pack Li-Ion battery. 3.7v n 1500mAh for per battery.
2. Li-Po and Li-Ion 7.4v 1500mAh will generated the motor.
3. 9mm refill cutter blade will be use as a blade of grass cutter.
4. The area of grass material that will test is 1m×1m.
5. ACS712 current sensor and voltage sensor is used to measure output current and voltage respectively
6. Arduino Nano will act as microcontroller to control the system

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Nowadays, the machines that have become very popular is grass cutter machines. Many people will use the grass cutter machines to furnishing their soft grass neatly(Abraham *et al.*, 2017) . Grass cutter and lawn mowing is need at a places such as soccer field , garden , home lawn , golf course and many others , but it is complicated to mowing it , which it depends on geographical location , weather trends and size of particular lawn , it will need a large amount of time and effort if anything bad situation happen(Sivarao *et al.*, 2016) .

One or more revolving blades are used in a lawn mower machine to cut a lawn either powered by electric motor or internal combustion engine to operate the blade , or to operate mechanical blades must pushing the mower forward . Mulching or collecting their clippings is some of mowers abilities and every type of mowers must be used with suitable scale and purpose of the lawn. It is tough choice to choose the suitable lawn, so some people developed automatic lawn robot that require no perimeter and wire but the robot still can maintain within the lawn. It also can be used automatically require no human effort or manually with less human effort to operate the automatic lawn robot(Mulla *et al.*, 2016).

Minimum performance of human to complete the task is the proved that technologies are being improve by automation of almost every machine and process that use daily. For the positive side, it will reduce the errors that normally human do to perform