



Faculty of Electrical and Electronic Engineering Technology



**INVESTIGATION OF POWER CONSUMPTION FOR SOLAR
POWERED GARBAGE COLLECTOR CLEANING TOOL ON THE
BEACH USING ARDUINO**

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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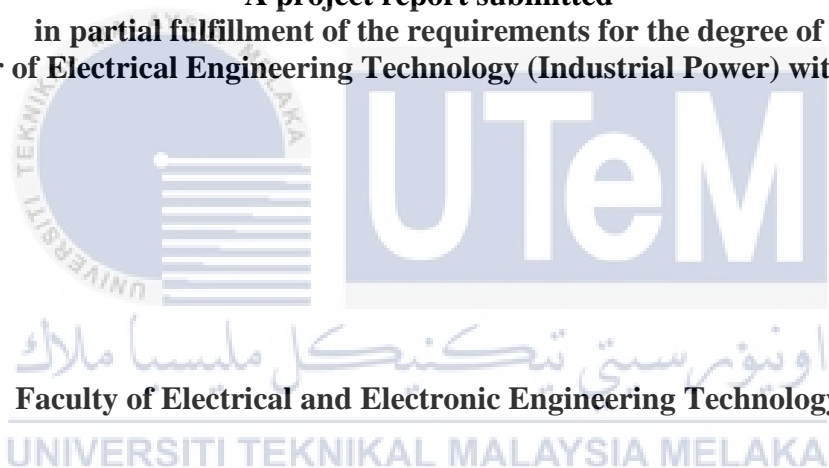
Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

2022

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ARDUINO**

NASRUL AZIM BIN KAMARUDDIN (B081910198)

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electrical Engineering Technology (Industrial Power) with Honours**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2022

**BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II**

Tajuk Projek : Investigation of power consumption for solar powered garbage collector cleaning tool on the beach using Arduino.

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DECLARATION

I declare that this project report entitled “Investigation Of Power Consumption For Solar Powered Garbage Collector Cleaning Tool On The Beach Using Arduino” 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.

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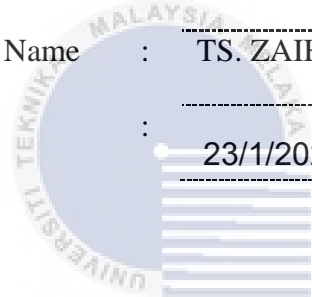


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DEDICATION

To my beloved mother, Rozaha Binti Abd Hamid, and father, Kamaruddin Bin Lot.

Every tough and difficult task necessitates full commitment

as well as the direction of renowned supervisors.

Our modest effort is devoted to my families, friends,

and those near to my heart. Whose devotion, love, support,

and prayers enabled us to accomplish

the project successfully.



ABSTRACT

This project is based on observation and is based on the current manual approach of sweeping or collecting garbage on the beach. The objective of this project is to design a prototype machine that can gather garbage in order to keep coastal areas clean. In addition, in this project, which uses 12 volts for the dc motor and 5 volts for the circuit. There are numerous scopes of research that have been established. In addition, the Arduino Uno microcontroller is utilised to control the movement of prototype machine. All of this is intended to address a number of issues, one of which is a labour shortage. According to a literature review conducted on the use of stainless steel on the coast, the material for this machine must also have a specific feature that is durable. In addition, the use of a suitable motor should be taken into account to move the prototype. The test findings show that the battery used is not suitable for long-term use due to the small battery capacity and the photovoltaic panel with an output value of 10 watts can charge the battery for a long time. The concept shown in this project is how to collect garbage that is on the coast. The environment should be cleaner and healthier because ecosystems should and will provide natural services for all species necessary for human survival, thereby improving quality of life and survival.

ABSTRAK

Projek ini diaplikasikan daripada pemerhatian berdasarkan kaedah manual yang digunakan sekarang iaitu menyapu sampah atau mengutip sampah di pantai. Objektif projek ini adalah untuk mereka bentuk mesin prototaip yang mampu mengutip sampah demi menjaga kebersihan di kawasan pantai. Selain itu, terdapat beberapa skop kajian yang telah ditetapkan dalam projek ini iaitu menggunakan 12 volt yang dibekalkan kepada motor dc dan 5 volt yang dibekalkan kepada litar. Selain itu, mikropengawal Arduino Uno digunakan untuk mengawal pergerakan mesin prototaip. Semua ini ditetapkan untuk menyelesaikan beberapa masalah yang timbul, antaranya ialah kekurangan tenaga kerja. Bahan untuk mesin ini juga mestilah mempunyai ciri khas iaitu tahan lasak berdasarkan kajian literatur yang dijalankan terhadap penggunaan keluli tahan karat amat sesuai digunakan di pesisiran pantai. Selain itu, penggunaan motor yang sesuai perlu diambil kira untuk menggerakkan prototaip. Penemuan ujian menunjukkan bahawa bateri yang dipakai tidak sesuai digunakan untuk masa yang lama atas sebab kapasiti bateri yang kecil dan panel fotovoltaiik yang bernilai keluaran 10 watt dapat mengecas bateri dalam masa yang panjang. Konsep yang ditunjukkan dalam projek ini adalah cara pengutipan sampah yang berada di pesisiran pantai. Alam sekitar harus lebih bersih dan sihat kerana ekosistem harus dan akan menyediakan perkhidmatan semula jadi untuk semua spesies yang diperlukan untuk kemandirian manusia, seterusnya meningkatkan kualiti hidup dan kelangsungan hidup.

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This project required a large time commitment, not only on my part, but of a few others. My highest appreciation goes to my parents and family members for their love, give moral support and give financial support to accomplish my project. But not least, I would like to express my thanks to my father and entire friend for their cooperation and helping to complete this project.



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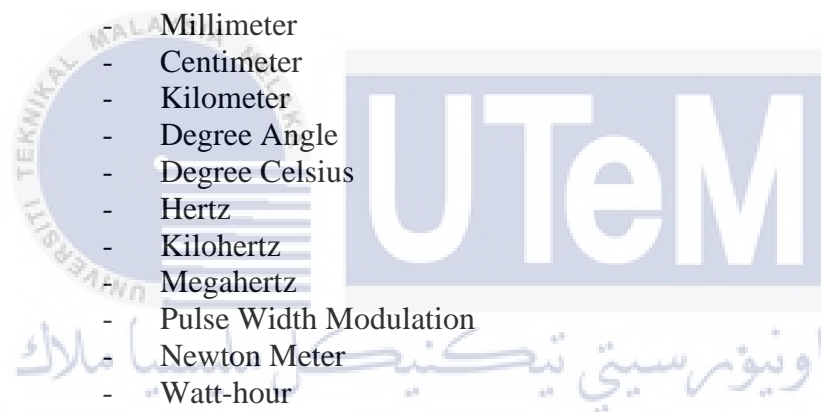
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LIST OF SYMBOLS

V	-	Voltage
DC	-	Direct Current
VDC	-	Voltage Direct Current
A	-	Ampere
Ah	-	Ampere Hours
mAh	-	Milliampere Hour
W	-	Watt
I/O	-	Input/Output
ADC	-	Analog-To-Digital
RPM/rpm	-	Revolutions Per Minute
kg	-	Kilogram
g	-	Gram
m	-	Meter
mm	-	Millimeter
cm	-	Centimeter
km	-	Kilometer
°	-	Degree Angle
°C	-	Degree Celsius
Hz	-	Hertz
kHz	-	Kilohertz
Mhz	-	Megahertz
PWM	-	Pulse Width Modulation
N.m	-	Newton Meter
Wh	-	Watt-hour



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LIST OF ABBREVIATIONS

Arduino IDE	-	Arduino Integrated Development Environment
L298N	-	Dual H-Bridge Motor Driver
RF	-	Radio Frequency
USB	-	Universal Serial Bus
WPA	-	Wi-Fi Protected Access
IP	-	Internet Protocol Address
Arduino UNO	-	Arduino One
PIC	-	Peripheral Interface Controller
LiPo	-	Lithium-Polymer Battery
3D	-	Three Dimensional
GPIO	-	General-Purpose Input/Output
Pi	-	Python
RAM	-	Random Access Memory
GPU	-	Graphics Processing Unit
ROM	-	Read Only Memory
HDMI	-	High Definition Multimedia Interface
JPEG	-	Joint Photographic Experts Group
NEMA	-	National Electrical Manufacturers Association
N/A	-	Not Applicable
IC	-	Integrated Circuit
Amps	-	Ampere
IN1-IN4	-	Input
Vcc	-	Power Supply
JD-Vcc	-	Relay Power
SPDT	-	Single Pole, Double Throw
IoT	-	Internet of Things
PWM	-	Pulse-Width Modulation
m	-	Meters
ml	-	Milimeters
AM	-	Ante Meridiem (Before Midday)
PM	-	Post Meridiem (After Midday)

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CHAPTER 1

INTRODUCTION

1.1 Background

The environment is important in our lives. The environment is now increasingly polluted because there are irresponsible parties who have done pollution. Coastal pollution is a very hot issue that is the talk of society now. Coastal areas are also areas where pollution often occurs. A polluted environment and atmosphere promote the spread of numerous diseases, putting society and other living things at danger. This project's purpose is to find solutions to help marine life habitats by reducing the impact of trash and litter on the ecosystem and everything in it. This project technique is specifically created to collect waste from beaches or along the shore to aid organizations and volunteers dealing with this issue.

1.2 Problem Statement

Among the causes of coastal pollution is that there are some people who think that the flowering of garbage everywhere is just normal. Due to that, coastal pollution is increasing every year. Among the causes of the lack of public awareness and lack of technological knowledge by the companies concerned to overcome this issue continues to occur and the lack of manpower is also one of the factors behind the occurrence of this problem. So far, the existing machines used to clean the beach are manual and require external support energy i.e., a tractor to move it. Tractors used cause environmental pollution due to the use of diesel oil.

1.3 Project Objective

The objectives of the study are aimed at ensuring important goals and decisions after the project is implemented. Here are the objectives in developing the project:

- a) To develop circuit to control direction of garbage collector cleaning tool.
- b) To develop garbage collector cleaning tool which effectively enables garbage collection.
- c) To analyse the performance the garbage collector cleaning tool.

1.4 Scope of Project

To complete this project, the scope has been defined as designing and developing a prototype of a waste collector cleaning tool to collect waste along the coast and prevent pollution. The project's constraint is that it will only produce an acceptable design that will only utilize 12 volts to provide the dc motor and 5 volts to supply the circuit. The project will then employ an Arduino Uno microcontroller to control the motor by using 4 channel relay modules. For the value of power consumption will show at display unit. Microcontrollers must run programming code, which is created using the Arduino IDE platform.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review in this section of the project focuses on comparing past projects that have been implemented, and these projects are similar to the beach cleaner concept. There is vast sort of alternative potential projects that may have identical structure of the Beach Cleaner. Hence, the similar literature review is going to be reviewed based on the concept and main objectives of every of the implemented projects. therefore, it's terribly critical to review previous work before delivering deeper into the development of the beach cleaner.

2.2 RF Controlled Beach Cleaner Robotic Vehicle



Figure 2.2.1: RF Controlled Beach Cleaner Robotic Vehicle.

Figure 2.2 represents another significant project developed by Nevon Projects: the RF Controlled Beach Cleaner Robotic Vehicle. The project's conclusion is that public sites such as the beach and therefore the sea have a tremendous number of people coming and returning

all year round, exposing them to a danger of disease transmission due to polluted surroundings and decaying rubbish at the boundaries[1].

2.2.1 Description of RF Controlled Beach Cleaner Robotic Vehicle

This project is based on a machine-driven vehicle, with the chassis consisting of a chain and sprocket system for trash collection and a bag attached for rubbish deposition. The system is navigated by a microcontroller, and the vehicle is driven by a remote-controlled motor. This was a simple and basic beach cleaning mechanism, and the findings revealed that it picked up tiny plastic bottles and cans, but it struggled to learn varied smaller rubbish equivalent to plastic bags, bottle caps, and so on[1].

2.3 Design and Fabrication of Beach Cleaning Machine



Figure 2.3.1: Design and Fabrication of Beach Cleaning Machine.

In this project, a mechanical system is used in the forward direction to help the raking conveyor in moving. The rotation wheels by pushing the vehicle to rotation the shaft indirect rotates the raking conveyor and collect the object and transport up to the waste box[2]. At figure 2.3.1, the design is similar to the conveyor's ranking system for picking up garbage on the beach surface. Furthermore, the project applies the same mechanics to move the conveyor, such as a chain and a sprocket at figure 2.3.2.1 and Figure 2.3.2.2.

2.3.1 Working Principle

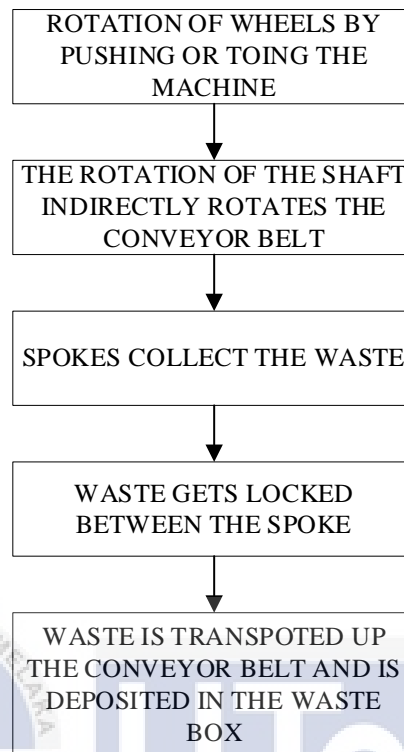


Figure 2.3.1.1: Working Method of the System.

When the machine is pushed ahead, its action helps the conveyor move. This is due to the presence of a sprocket on the shaft that connects to the wheel. The sprocket is then connected to the conveyor shaft via a chain drive[2].

2.3.2 Material



Figure 2.3.2.1: Simplex Chain.