UNIVERSITI TEKNIKAL MALAYSIA MELAKA

TRANSDUCER ENERGY BASED ON ELECTRIC FAN

This report submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honours

by

(AINUR MUNIRA BT MOHD LATIF MAREKAN)

(B071310480)

(930226075656)

FACULTY OF ENGINEERING TECHNOLOGY

2016

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: Transducer Energy Based on Electric Fan

SESI PENGAJIAN: **2016/17 Semester 1**

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Industrial Electronic) with Honours. The member of the supervisory is as follow:

……

(Mr. Hasrul ‘Nisham bin Rosly)

ABSTRAK

Pada era globalisasi kini, elektrik adalah sangat penting kerana ia adalah serba boleh serta mudah untuk dikawal dan digunakan dalam kehidupan seharian kita. Manusia tidak akan dapat menikmati kehidupan moden dengan sebaik mungkin jika elektrik tidak dibekalkan dengan sebaik mungkin. Penggunaan elektrik adalah cara yang paling strategik kerana ia amat mudah digunakan serta menyumbang bekalan tenaga kepada manusia. Tambahan pula, bekalan elektrik yang digunakan tidak mewujudkan sebarang kerugian serta pencemaran alam . Sebagai contoh, televisyen, radio, pita perakam, pemanas, pengering rambut memerlukan kuasa elektrik untuk berfungsi. Selain itu, manusia tidak menyedari bahawa kuasa elektrik adalah aset negara yang perlu dipulihara dengan baik. Kertas kerja ini membincangkan tentang tenaga transduser berdasarkan kipas elektrik. Tujuan projek ini adalah untuk memperkenalkan alternatif yang berkesan iaitu dalam menukarkan tenaga kinetik kepada tenaga elektrik menggunakan DC gear motor. Selain itu, berdasarkan projek ini, jumlah semasa, voltan dan RPM yang diperlukan untuk mengecas bateri sepenuhnya dapat dihitung serta digunakan oleh masyarakat.

ABSTRACT

Nowadays, electricity is very important because it is versatile, controlled easily and it is used in everyone's daily life. Without electricity, humans would not be able to enjoy next to no modern conveniences. Electricity is considered a very efficient way of energy consumption in part because it is weightless as well as easy to contribute. Furthermore, electricity is used without creating loss and without creating pollution. For example, the television, radio, tape-recorder, heater, hair-dryer are running by electric power. Moreover, people did not-realize that electricity is a national asset and should be conserved and used with care. This report presents about the transducer energy based on the electric fan. The aim of this project is to introduce cost efficient alternative in converting kinetic energy into electrical energy using DC gear motor. Besides that, from this result the amount of the current, voltage and RPM needed for battery can be fully charged is calculated and can be used in our communities.

DEDICATION

To my beloved parents, siblings and fellow friends;

Mohd Latif Marekan,
Aini Hayati Othman,
Rahimah Abdullah,
Ahmad Muzaffar,
Norasila Rasi,
Ahmad Muizz,
Nurliyana

and;

BETE classmates.

ACKNOWLEDGEMENT

First of all, Alhamdulillah to The Almight, Allah s.w.t for His gratefulness for allowing and helping me in so many ways in completing my Bachelor Degree Project (Projek Sarjana Muda)

I would like to express my sincere gratitude to all those who provide me the possibility to complete this report. An extraordinary appreciation I provide to our final year supervisor, Mr Hasrul 'Nisham Bin Rosly, whose contribute in giving an ideas and encouragement, helped me to organize my project specifically in writing this report. Furthermore, I would like to acknowledge with much appreciation to the staff of UTEM, who gave the approval to use all compulsory equipment and the necessary materials to complete the task. A big thanks and gratitude goes to my mates, who help me accumulate the parts and gave suggestion about the task. Last but not least, a special thanks goes to my parents, whose have invested hiss full effort in guiding the team in achieving the goal. I have to appreciate the guidance given by another supervisor as well as the panels, especially in our project presentation that has improved our presentation skills.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

mAh	-	Millis ampere per hours
RPM	-	Rotation per minute
A	-	Ampere
I	-	Current
V	-	Voltage
vs	-	Versus
mins	-	Minutes
USB	-	Universal Serial Bus
GSM	-	Global System for mobile (Communications)
DC	-	Direct Current
AC	-	Alternating Current
PWM	-	Pulse with Modulation
AVR	-	Automation Voltage Regulator
BLDC	-	Brushless DC Motor
Etc.	-	Et Cetera
%	-	Percentage
IR	-	Infrared Sensor
R	-	Resistance
ω	-	Motor speed
Vs	-	Source Voltage
k	-	Constant
Vi	-	Voltage input
Vo	-	Voltage Output
D	-	Duty Cycle

CHAPTER 1

INTRODUCTION

1.0 Introduction

During this chapter, it states about some overviews of the project that contain the background, objective, scope, problem statement and report structure.

Development of Transducer Energy based on Electric Fan Using Arduino. This project is about to generate of electric through an electric fan in DC motor 12V High Torque. The electric fan can convert kinetic energy to the electrical energy. DC motor is to generate current and store in a battery, by using Arduino while can have the RPM (rotation per minute) and can know how much current can be produced in one minute. For example, from this result the amount of the current and time needed for battery can be fully charged is calculated and can be used in our communities such as street light, charging the phone, laptop and so on.

1.1 Project Background

The devices that changes one form of energy to another is called a transducer. Signal in one form of energy is converts to another is a transducer. Transducers are frequently useful at the limits of robot, approximation, and control frameworks, where electrical signals are different over to and from other

physical conditions (vitality, power, torque, light, movement, position, and so forth.)

This project depends on Arduino board design. Arduino is an open source microcontroller advancement board. Arduino can read sensors and control things, for example, motors and lights. This permits to transfer projects to this board which can then associate with things in this present reality. Other than that, it can make devices which react and respond to the world on the loose. This system gives sets, digital and analog I/O pins that can be interfaced to different development sheets ("shields") and different circuits. The boards feature serial communications interfaces, including USB on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino venture gives an incorporated advancement environment (IDE) taking into account the Processing venture, which incorporates support for the C and C++ programming language. In this anticipate, DC motor 12V is utilized to produce the force and store to the battery, use the Arduino to show the quality voltage and current likewise RPM (rotation per minute). Plus, when the speed of electric fan is rising, the current similarly will quickly high.

1.2 Objective of project

There are three objective of this project, which are:

a. To study the transducer energy based on motor.
b. To determine current generate when electric fan is functioning.
c. To develop a system that can convert kinetic energy into electrical energy.

1.3 Scope of Project

This scope is focused on how to design a transducer energy based on DC motor high torque 12v and determine the current generate when electric fan is functioning. Basically, there are consists of two major divisions that need to be focused on this project, which are hardware and software designs.

1.3.1 Hardware Design

For hardware part, it consists of eight types of hardware that are used in this project. There are DC gear motor, electric fan, RPM sensor, current Arduino sensor, DC-DC Boost Converter (step up), Arduino UNO, power bank and LCD display. DC gear motor that used for this project can convert direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Next, for electric fan, it consists of three speeds for electric fan. First speed is slower. Second speed faster and third speed is faster. When the speed of electric fan is rising, the current and RPM also will rapidly high. After that, for revolutions per minute (abbreviated rpm, RPM, rev/min, r/min) is a measure of the frequency of rotation, specifically the number of rotations around a fixed axis in one minute. The function is to measure of rotational speed of a mechanical component. Current Arduino sensor is to display current at LCD. Then, the function of DC-DC Boost Converter is to add up the voltage of the motor input. For LCD monitored, it will display the amount of current, RPM and voltage for power bank to fully charge to be used for electronic device such as mobile phone, speaker, MP3 and so on. Lastly, for Arduino Uno which is a microcontroller board has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB

cable or power it with a AC-to-DC adapter or battery to get started. For this project, arduino connect the software and hardware together.

1.3.2 Software Design

For software part, Arduino software is used in this project which is integrated development environment (IDE) is a cross-platform application written in Java and derives from the IDE for the Processing programming language and the Wiring projects. It is to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features like syntax highlighting, brace matching, and automatic indentation, and it is also capable of compiling and uploading programs to the board with a single click. A program or code written for the Arduino is called a sketch.

1.4 Problem Statement

Today existence without power is practically unthinkable. Advanced life has become so modern and so mechanical that even for all small things in daily life people need is electricity. The television, radio, grinder, tape-recorder, heater all that we are using at home are consecutively only by electric power. Nowadays, people did not-realize that electricity is a national asset and should be conserved and used with care. As a result, the consumption of that form of energy sometimes becomes a problem because the generating capacity cannot match the demand. Furthermore, the electric bills have become more expensive and rapidly high for this era. Saving energy through simple measures, such as turning off lights in unused rooms and turning down your water heater, can provide you and the environment with a wide range of benefits. Besides that, it is to avoid from global warming because electricity comes from fossil fuels such as oil, natural gas, coal and so on. For example, if using too much of oil resource it may lead to carbon emission.

1.5 Project Outline

Chapter 1 explains the introduction chapter is brief about an idea of the project and will cover the overview of the project. This chapter will cover several important parts are the synopsis of project, problem statement, objectives and scopes of a project.

Chapter 2 describes the literature review of recent records, circuits and problem statement with regard to the project.

Chapter 3 provides a description about the methodology in order to implement this project from the start until the end. The methodology is illustrated using the flow chart and each of the contents of the flow chart is described in this part. Besides, the circuit design that uses Proteus 8 Professional will be also explained in this chapter.

CHAPTER 2

LITERATURE REVIEW

In this chapter, it presents the literature review which discusses about everything that connected to the project. It includes the study of the hypothesis and the structure of the task. Besides, this chapter also covers about the components and equipment that will be used in designing both hardware and software for the project. Established on the research that had been practiced previously, this project will be focused more on human being as they sustain a great potential of wasteful the energy and this can lead to a worst environment condition. The research shows the major cause of this problem is the people did not-realize that electricity is a national asset and should be conserved and used with care. That is why this project will introduce an electric fan that can convert kinetic energy into electrical energy. This estimation, then goes to a project named as Transducer Energy based on Electric Fan.

2.0 Introduction

In the process of project development, literature reviews are shown to understand the theory, methods and technologies connected with systems that have been built up. Background research on the organization and relative studies of existing systems are also done to give more understanding about the system requirements before the systems was developed.

A transducer is a device that converts one form of energy to another. Usually a transducer converts a signal in one form of energy to a signal in another. The most important of energy efficiency are it can save your money and it is good for the environment that can enhance the quality of life. To prevent it from wasteful of energy and long-lasting, DC gear motor is used for this project, which is to convert direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields.

When the speed of electric fan is rising, the current also will rapidly high. After that, for revolutions per minute (abbreviated rpm, RPM, rev/min, r/min) is a measure of the frequency of rotation, specifically the number of rotations around a fixed axis in one minute. It is used as a measure of rotational speed of a mechanical component.

2.1 Research on previous project

For example, katke. SP et.al (2015) suggested by DC motor speed control system by using microcontroller PIC 16F877A. It is a closed-loop control system, where optical encoder is coupled to the motor shaft making the feedback speed signal to the controller. The signal is produced in microcontroller using Pulse Width Modulation (PWM) technique. Besides that, to vary the voltage supply to the motor, the PWM signal will send to the motor driver to keep a constant speed. For this, the microcontroller PIC 16F877A can control motor speed at desired speed, although there is a variation of load.

Trupti S Bobade et.al (2015) proposed an Induction Motor Speed Control Using Android Application. Android mobile is a transmitter and the received by Bluetooth receiver interfaced with AVR microcontroller of 8051 families. AVR is an advanced version of the 8051 microcontroller. Each time data is sent by android application as per code written is executed by AVR to deliver supply signal to trace

through optical isolation. Then, the power to load connected in series with the track is controlled based on receiving signal and speed control of induction motor is achieved.

G. Santhosh Kumar et.al (2015) proposed a Brushless DC Motor Speed Control Using Microcontroller. Closed loop control technique is aimed to control the speed of a BLDC motor. BLDC motor has several applications used in industries such as in drilling, lathes, spinning, electric bikes, etc. The speed control of the DC motors is very important. This proposed system offers a very precise and effective speed control system. The user must enter the desired speed and the motor will run at that exact speed. Brushless DC motors like fans are smaller in size and weight than AC fans using shaded pole or Universal motors. These motors have the capability to work with the available low voltage sources such as 24-V or 12-V DC supply, it can make the brushless DC motor fans suitable for use in electronic equipment, computers, mobile equipment, vehicles, and spindle drives for disk memory, because of its high reliability, efficiency, and ability to reverse rapidly.

E. Murugan et.al (2014) proposed an Embedded System Based Submersible Motor Control for Agricultural Irrigation Using GSM and to Prevent Its Against Over Loading, Dry Running and Single Phasing Automatically. Embedded System based submersible motor control to prevent it from overload, dry run and single phasing using GSM for Agricultural Irrigation is the work done in this project, which can be utilized to control and screen the submersible motor used for farming watering system utilizing GSM system. The idea of this project is to build up a cost effective solution that will give remote control to impel motors through cellular telephones utilizing missed calls and messages. The mobile user in the world has an incredible rise during the past few years. Remote monitoring of processes, machines, etc., is popular due to advances in technology and decrease in equipment cost.

Sagarika Pal et.al (2011) proposed a Remote Position Control System of Stepper Motor Using DTMF Technology. DTMF innovation has been utilized to

position the pole of the stepper motor at a south point which in turn might be utilized as a part of the different application region. As a customary RF remote framework has separation constraint, DTMF innovation has been utilized here. The system developed in this project is very much simple, rugged, and cost effective. The trial result demonstrates that one step angle resolution has been achieved in the range between 3.5° and 24°. Additionally, other precise positions past 24° can be accomplished by squeezing a mix of two or more keys on the key cushion of the mobile phone user. The error in the measurement is within ±2. 77% which is acceptable. Any angular position between 0° and 360° can be found from this system and the achieved angular position can be varied only in integral multiple of one step angle (1.8°). Application of such control system of stepper motor in remote surveillance system is the future scope of this work.

2.2 Research on Similar project

Nowadays, people did not-realize that electricity is a national resource and should be conserved and used with care. Therefore, the consumption of that form of energy sometimes becomes a problem because the generating capacity cannot match the demand. Furthermore, the electric bills have become more expensive and rapidly high for this era. The benefit of renewable energy sources are breathtaking, and while we may not quite be in a position to fully switch over to renewable energy sources just quite yet (requiring a balance of renewable energy and other sources for now), it is basic that we look ahead to the future.

Saquib Gadkari et.al (2014) explained that, world is a storehouse of energy. We all know that energy can neither be created nor be damaged but can be transformed from one form to another. But we are wasting resources that can produce energy as if they are limitless. If we can renew and reuse the energy we unwanted, it would help in some way to the problem of scarcity of energy, which is the major threat of the present world. By using the concept of wind turbines, wind-generated electricity can be used for battery charging and for connection with the power grid. Beside every fan there is a tube light by a mechanism inside the fan motor or a belt that exchanges and light up the bulb or store the energy in a battery which could be