



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN OF SUPPLY GENERATOR FROM PRESSURE ON WATER FLOW USING MICROCONTROLLER

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

by

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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:

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ABSTRAK

Tenaga elektrik adalah sumber tenaga yang sangat penting dalam kehidupan seharian terutamanya untuk pembangunan manusia dan perindustrian. Tenaga sumber boleh diperolehi dari air, gas, arang batu, nuclear dan angin. Skop untuk penjanaan elektrik projek ini lebih tertumpu kepada tekanan air. Oleh itu, tenaga hidro adalah salah satu pilihan terbaik dan cara yang cekap untuk mendapatkan tenaga boleh diperbaharui yang bergantung pada pengalaman lebih banyak daripada abad untuk masalah ini. Dalam kajian ini, kita berminat untuk membentuk aliran vortex air dengan graviti bahawa keupayaan menjana tenaga di kawasan rendah rata geografi dan ia juga mesra alam. Oleh kerana keperluan kepala air yang rendah, sistem ini boleh dipasang di sistem pengagihan sungai atau air di rumah untuk menjana tenaga. Kertas ini ditumpukan kepada kuasa hidro air vortex yang dicipta untuk menyiasat keluaran kuasa elektrik.

ABSTRACT

Electrical power is very important source energy in social and commercial investments especially for human and industrial development. The source energy could be derived from water, gas, coal, nuclear and wind. Scope for this project electricity generation more concentrated on water pressure. Therefore, hydropower energy is certainly one the best option and efficient way to obtain renewable energy which depends upon a lot more than century of experience for this issue. In this study, we are interested in the forming of a water vortex stream by gravitation that capability of generating energy at low-head flat geographically area and it also environmental friendly. Because the requirement of head is low, this power plant could be installed at river or water distribution system in house to generate energy. This paper is being focused on created gravitational water vortex hydropower to investigate electrical power output.

DEDICATION

This project and thesis are wholeheartedly dedicated to our beloved parents, who have been our source of inspiration and gave us strength who continually provide their moral, spiritual, emotional, and financial support.

To our brothers, sisters, relatives, supervisor, lecturer and who shared their words of advice and encouragement to finish this study. To my close friends, Muhammad Hafiz bin Roslan, thank you for helping out throughout completion this project.

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TABLE OF CONTENTS

	PAGE
TABLE OF CONTENTS	ix
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF APPENDICES	xvi
LIST OF SYMBOLS	xvii
LIST OF ABBREVIATIONS	xviii
LIST OF PUBLICATIONS	xix
CHAPTER 1 INTRODUCTION	20
1.1 Background	20
1.2 Problem Statement	21
1.3 Objective	21
1.4 Scope	22
CHAPTER 2 LITERATURE REVIEW	23
2.1 Introduction	23
2.2 Background Hydro Power	23
2.3 Type of Hydro Power System	24
2.3.1 Impulse Turbine	25
2.3.2 Reaction Turbine	26
2.3.3 Gravity Turbine	27
2.4 Implementation of Water Vortex Hydro Power (WVH)	29
2.4.1 Basin Configuration	29
2.4.2 Inlet and Outlet Configuration	32
2.4.3 Turbine	33
2.4.3.1 Type Turbine	33
2.4.3.2 Number of Turbine Blade	35
2.4.4 Material of Turbine	37
2.4.5 Eco Green Environment	39
CHAPTER 3 METHODOLOGY	41

3.1	Overview	41
3.2	Water Vortex Hydro Power (WVH)	42
3.3	Design WVH Structure Topology	43
3.4	WVH Structure Design Review	44
3.5	WVH Mechanical and Electrical Components	45
3.5.1	Turbine	45
3.5.2	Induction Washing Machine Motor	Error! Bookmark not defined.
3.5.3	Meter Flow Rate	46
3.5.4	AC-DC Converter	47
3.5.5	LCD Keypad Shield	48
3.5.6	Arduino Uno	48
3.6	System Development	49
3.6.1	SolidWorks 2016 software for design WVH model	50
3.6.2	Rectifier 3-Phase AC to DC	52
3.6.3	Arduino IDE software for programming	53
CHAPTER 4 RESULT AND DISCUSSION		54
4.1	Overview	54
4.2	Result of Design	55
4.2.1	Flow Simulation of WVGH in Solid Work 2016	55
4.2.2	Mechanical Design	56
4.2.2.1	Cylindrical Basin	56
4.2.2.2	Turbine	57
4.2.3	Electronic Design	59
4.3	WVH Cylindrical Basin Research Study 1	61
4.3.1	Cylindrical Basin with Radius of 10mm.	61
4.3.2	Cylindrical Basin with Radius of 20mm.	61
4.3.3	Cylindrical Basin with Radius of 30mm.	62
CHAPTER 5 CONCLUSION AND FUTURE WORK		68
5.1	Introduction	68
5.2	Summary of Research	68
5.3	Achievement of Research Objective	68
5.4	Significance of Research	69
5.5	Problem Faced During Research	69

5.6	Suggestion for Future Work	70
REFERENCES	72	
APPENDIX	73	

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1	: Comparison of Different Type of Hydro Power	25
Table 2.2:	Maximum efficiency obtained at each Test	35
Table 3.1:	Specification of Meter Flow Rate.	46
Table 3.2:	Dimension of WVH Model	51
Table 3.3:	Dimension of Turbine	52
Table 4.1	: Flow Rate	62
Table 4.2	: Voltage Obtain by turn shaft by hand (Dry Test)	66
Table 4.3	: Water Turbine Generator Voltage	67

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2.1	: Pelton Turbine	26
Figure 2.2	: Francis Turbine	26
Figure 2.3	: Kaplan Turbine	27
Figure 2.4	: Archimedes Screw Turbine	28
Figure 2.5	: Vortex Turbine	28
Figure 2.6	: CFD model and mesh (Stream line of flow direction)	30
Figure 2.7	: Boundary condition of conical basin	31
Figure 2.8	: Gravitational Water Vortex Power Plant side view	32
Figure 2.9	: Gravitational Water Vortex Power Plant top view	32
Figure 2.10	: Structure of flow simulation through the conical basin	34
Figure 2.11	: Time for moving of turbines from stopping points	38
Figure 2.12	: The total efficiency of the both turbines which had water	38
Figure 2.13	: Eco environmental; Fish Friendly.	40
Figure 3.1	: WVH Operation Diagram	42
Figure 3.2	: The proposed design water vortex model topology.	43
Figure 3.3	: Model of WVH Structure	44
Figure 3.4	: Example of Turbine	45

Figure 3.5	: Induction Motor Washing Machine	46
Figure 3.6	: Physical Sensor Flow Rate	47
Figure 3.7	: AC – DC Converter	48
Figure 3.8	: LCD Keypad Shield	48
Figure 3.9	: Arduino Uno	49
Figure 3.10	: WVH Model View designed in SolidWorks	50
Figure 3.11	: Turbine designed in SolidWorks	51
Figure 3.12	: Three-phase full wave diode bridge rectifier	52
Figure 3.13	: Arduino IDE Software	53
Figure 4.1	: WVH Flow Simulation in SolidWorks	55
Figure 4.2	: WVH Cylindrical Design Using SolidWorks	56
Figure 4.3	: Model Prototype of WVH Cylindrical Design	57
Figure 4.4	: WVH Turbine Design Using SolidWork	58
Figure 4.5	: Model Prototype of WVH Turbine	59
Figure 4.6	: Electronic Circuit	59
Figure 4.7	: Circuit of Monitoring Data WVH	60
Figure 4.8	: Basin with radius of 10mm, 20mm and 30mm	62
Figure 4.9	: Graph of Radius vs Outlet Flow vs Voltage	63
Figure 4.10	: Vortex Profiles Different Configuration	63
Figure 4.11	: 2 induction motor and 1 ceiling fan motor	64
Figure 4.12	: Induction motor before and after place magnet.	65

Figure 4.13	: Direct Drive Motor add hub, bearings and shaft.	66
Figure 4.14	: Water Turbine Generator	67
Figure 5.1	: Suggestion of mechanism	70
Figure 5.2	: Different Height of Cylindrical Basin	71

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
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LIST OF SYMBOLS

L/min	-	Litre per minute
V	-	V
A	-	Ampere

LIST OF ABBREVIATIONS

WVH	Water Vortex Hydropower
DC	Direct Current
AC	Alternate Current

LIST OF PUBLICATIONS

CHAPTER 1

INTRODUCTION

1.1 Background

In general, the composition of the population especially in Malaysia need of water resources as daily use such as bathing, drinking, washing clothes and so on. The water sources can be distributed to users from the water distribution plant. Water distribution system consist of the factors taken such as gravity, pressure, reservoirs, pumping distance before distribution to consumers.

Based on the water distribution system of electricity can be provided from a combination of the water pressure comprised gravity, tendency, pumping, and piping system. Construction of the generator can be built on top of a high-pressure pipeline. Electrical energy will be produced by water pressure through turbine. When flow rate water pressure is higher the more speed are rotation blade, so the more electrical energy will be generated. Factors affecting the speed of the turbine is gravity, location, size of basin, inlet and outlet of the basin. The concept of system it's convert potential energy to electrical energy. The electrical energy produced will be support or backup to maintain and sustain the operation system water treatment supply system.

1.2 Problem Statement

Nowadays, world is in fact rely heavily on fossil fuel energy sources such as coal, oil and natural gas. Malaysia's reliance on fossil fuels for electric power is staggering. In 2013, we exceeding 90% of electricity produced in Peninsular Malaysia originated from fossil fuels, with coal and gas each yielding 43.7% while fuel oil and diesel, 3.3%. Nevertheless the amount of the above fossil fuel energy is decreasing daily which might eventually depleted at the end. In order to guarantee having the adequate alternatives energy is certainly hydropower which uses hydro turbines or water turbines to generate electric power. For home sector, there a vortex hydro turbine generator, make sure reliable flow of water could be harnessed. The turbine is normally implement to convert energy from water to shaft power which drive to generator or alternator.

The structure, type of material will affect the power output and efficiency of turbines. So, correlation between the design parameters and the efficiency of the output shaft rotating speed will be identified.

1.3 Objective

- I. To design a prototype generator based on water flow.
- II. To analyze the performance of the designed system based on different characteristic of the system.
- III. To apply the designed system on daily usage equipment.

1.4 Scope

A working scope is a guideline that ensure the project accomplished to the objective. The scope are:

- I. To design power supply generator based on water pressure system using Arduino.
- II. The performance of the designed system will be analyzed by observing different diameter basin of the water flow system.
- III. The effectiveness of the designed system will be tested by apply it to daily usage equipment.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss about the literature studies and researches that is made along the development process of the project. The books studies and studies are obtained either from journals, article or thesis. All journal, thesis or article has been used related to the research of the Water Vortex Hydropower (WVH).

2.2 Background Hydro Power

(Haidar, Senan, Noman, & Radman, 2012) Hydropower plants is a clean way to obtain energy that convert potential energy or water into electricity, the water after generating electrical energy is designed for irrigation and other reasons. The first usage of moving water to produce energy was a waterwheel on the Fox River in Wisconsin in 1882. Hydropower may be the most broadly used renewable power source worldwide since it contributes 19% of the world's power from both huge and small power plants. Hydropower is poised to play a significant role in meeting Malaysia's climate and energy goals increasingly. The share about hydropower in the country's electricity generation is just about 11 %. The water turbine originated in the nineteenth century and was trusted for industrial power just before electrical grids. Today, water turbines are mostly used for hydroelectric power generation. In Malaysia, hydropower utilization for electric power generation were only available in July 1900 when a little hydroelectric plant was built on the lender of Sempam River near Raub, Pahang by the Raub-Australian gold mining

business. The use of hydropower in Malaysia to provide electricity for domestic use, nevertheless, was only available around 1970s commercially. Although Malaysia had effectively benefited from large and small scale hydropower to create electricity but no effort have been made to make use of hydro generation in the number of micro or pico-hydropower systems. If this potential is used, the power can be produced from a clean energy which will provide a great choice for the issues of energy supply in remote and hilly areas where in fact the extension of grid program is comparatively uneconomical. Small hydropower systems are the program of hydroelectric power on an industrial scale supplying small loads and are categorized by power and size of waterfall. This operational system could be split into mini, micro and pico-hydropower. Until now, self-excited induction generator and permanent magnet synchronous generators are shown as best variants for this kind of generators.

2.3 Type of Hydro Power System

Turbines are also divided by their principle of procedure and can be:

- I. An Impulse turbine, which is usually driven by a high-velocity water jet (or multiple jets) of water.
- II. A Reaction turbine. The rotor of a response turbine is completely immersed in water and is definitely enclosed in a pressure casing. The runner blades are profiled to ensure that pressure variations across them impose lift forces, as on aircraft wings just, which trigger the runner to rotate quicker than can be done with a water jet.
- III. A Gravity turbine can be driven by just the weight of drinking water entering the very best of the turbine and dropping to the bottom, where it really is released - for instance, vortex turbine.