

**APPLICATION OF ARTIFICIAL NEURAL NETWORK FOR WIND SPEED  
PREDICTION**

This thesis is presented in partial fulfillment for the award of the Bachelor of  
Engineering (Hons) Electrical

**FACULTY OF ELECTRICAL ENGINEERING  
UNIVERSITI TEKNOLOGI MARA  
MALAYSIA**



**JUZAILI YZZATI BT JOHARI  
Faculty of Electrical Engineering  
Universiti Teknologi Mara  
40450 Shah Alam  
Selangor Darul Ehsan**

## **ACKNOWLEDGEMENT**

In the name of ALLAH S.W.T, The most Beneficent, The most Merciful. It is with the deepest sense of the Al-Mighty Allah that gives me the strength and ability to complete this project. All good aspirations, devotions and prayers are due to ALLAH whose blessing and guidance have helped me throughout the entire project.

I wish to express my sincere appreciation to my supervisor, Miss Dalina Binti Johari from the Faculty of Electrical Engineering, Universiti Teknologi MARA for her guidance, advices and motivation in supervising my project from the beginning until the completion of this project thesis. Without her continued support and interest, this thesis would not be the same as what have been presented here.

Thanks to all my friends Nurul Akmal, Mohd Khairul Azlan, Ili Syawana, Mohd Nasri and other for their moral support and valuable help to me for completing this project

Last but not least, my special thanks to my beloved family, especially my mother and my father, En Johari Bin Mohd Zin and for the endless support and encouragement they have given and for being so understanding.

## **ABSTRACT**

This paper presents the application of Artificial Neural Network (ANN) for predicting wind speed in Malaysia by using a historical of meteorological data. Wind energy depends on the wind speed, which is random variable. The artificial neural network was trained using error back propagation learning rule. Meteorological data measured during four years from Kuala Terengganu weather station were used to form learning patterns. The trained artificial neural network was tested with different patterns. As a result, the model based on the neural network showing that the predicted wind speed values are in good agreement with the actual wind speed values.

Keywords: Wind speed, artificial neural network (ANN), back propagation

# TABLE OF CONTENTS

	<b>PAGE</b>
DECLARATION	i
ACKNOWLEDGEMENT	ii
ABSTRACT	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	vii
LIST OF TABLES	viii
SYMBOLS AND ABBREVIATIONS	ix
<b>CHAPTER 1</b>	
<b>INTRODUCTION</b>	
1.1 Background	1-3
1.2 Problem	3
1.3 Objective	4
1.4 Scope of Work	4
1.5 Organizational Of Project	4-5
<b>CHAPTER 2</b>	
<b>LITERATURE REVIEW</b>	
2.1 Wind Energy	
2.1.1 Introduction	6-7
2.1.2 Factor Influence the wind energy	7-9
2.1.3 Mathematical Formulation	9-12
2.1.4 Advantages and Disadvantages	12-14

# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND

In view of depletion of fossil fuels such as petroleum, natural gas and coal, the harvesting of energy from natural energy sources such as wind, wave and solar is currently much sought after. Wind as one of the natural sources of energy, is not popular in Malaysia. The Malaysian climate is not windy. Only certain season the wind will blow quite strongly. Hence, to harness the wind energy in Malaysia, a study on the timely windy season must be conducted. This project is about using application of artificial neural network for wind speed prediction for harvesting its energy and its suitability as alternative energy source in Malaysia.

Primary energy supply mainly comes from fossil fuels and fusion reaction which better known as nuclear energy. Nuclear energy is expensive in constructing the reactor, and also required special expertise. On the other hand, the fossil fuels are limited in supply. In our day to day life, we cannot escape from exhausting those fossil fuels by using it directly such as in the automotive vehicles and machines or indirectly such as electricity and heater.[8]

Fossil fuels are formed from plants and animals that are buried deep underneath the Earth's surface for millions of years. Their remains collectively transformed into combustible material either in solid, liquid or gas form. Those fossil fuels were better known as coal, crude oil and natural gas respectively. Generating energy from fossil fuel