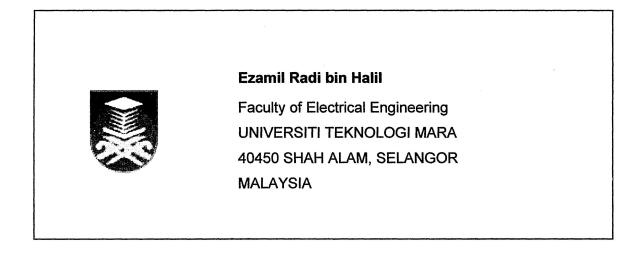
### FUZZY LOGIC SPEED CONTROLLER FOR DC MOTOR

Project Report is presented in partial of fulfillment for the award of the Bachelor of Electrical Engineering (Hons)

# UNIVERSITI TEKNOLOGI MARA MALAYSIA



#### ACKNOWLEDGEMENT

Alhamdullilah, In the name of Allah SWT, The Most Gracious and The Most Merciful who have given me the strength and ability to complete this project successfully. Prayer is upon His final Prophet Muhammad SAW.

My greatest gratitude and appreciation goes to my supervisor Prof. Ir. Dr. Shah Rizam Mohd. Shah Baki. Her continued guidance and invaluable advice has helped me tremendously in completing this project successfully. Apart of being active involved in the project she was also a continuous source of inspiration throughout the completion of this project. Thank you for your patient and understanding.

My gratitude also goes to my beloved family who always been supportive. Thank you to my best friends who was always being there encourages and shares their knowledge with me towards the accomplishment of this project. Also to Encik Razali bin Abdul Hadi who has given me useful ideas and opinions in completing this research. Without his assistance and sacrifices, this research will not as it should be now.

My thanks go to my team project especially Fadhil bin Ismail and Rosmawati which help to constrain me when I losing control and support me doing this project.

Lastly, my gratitude also goes to people who has helped me directly or indirectly in completing this project.

Thank you, without your love, support and understanding completing this project would not be possible.

ii

#### ABSTRACT

Today, there are many types of DC motor controller that had been designed. Engineers had designed new methods of speed control, which improve the performance of the motor.

Motor controllers are important especially to DC motor where they are used currently in many industries. DC motors have several variable characteristics and are used extensively in variable speed drives. They are also can provide a high starting torque and also possible to obtain speed control over wide range. The methods of speed control are normally simpler and less expensive than those of AC drives.

In this project, focuses on a control system using a fuzzy logic controller (FLC) for separately excited DC motor. To acquire an accurate fuzzy logic control algorithm, a simulation with MATLAB program has been made. The major benefits of this project lies in an original approach where fuzzy logic is applied without requiring any specific expertise in conventional method. Benefits are discussed and concrete results are given.

## TABLE OF CONTENTS

CHAPTER	TITIL	PAGE			
	DEC	i			
	ACK	ii			
	ABS	ABSTRACT			
	TABI	TABLE OF CONTENTS			
	LIST	LIST OF FIGURES			
	LIST	Viii			
	LIST	ix			
1	INTR	INTRODUCTION			
	1.1	Backg	1		
	1.2	Proble	Problem statements		
	1.3	Objec	Objective		
	1.4	Scope	Scope of work		
	1.5	Orgar	ization of project report	3	
2	DIRE	4			
	2.1	Introd	Introductions		
	2.2	2.2 DC Motors			
		2.2.1	Types of DC Motors	5	
	2.3	Basic	Parts of the DC Motor	5	
	2.4	Comn	Commutation		
	2.5	Types of DC Motors		7	
		2.5.1	Separately-Excited Motors	7	
		2.5.2	Shunt Motors	7	
		2.5.3	Permanent Magnet DC Motors	8	
		2.5.4	Series Motors	9	
		2.5.5	The Compound-Wound DC Motor	9	
		2.5.6	Separately Excited Field DC Motors	9	
	2.6	Motor	Motor Speed		
	2.7	DC G	DC Generators		

PROP	ORTIO	NAL-INTEGRAL-DERIVATIVE			
CONT	ROLLER (PID CONTROLLER)				
3.1	Introdu	uction	11		
3.2	Control loop basics				
3.3	Theory				
3.4	Parameter nomenclature				
3.5	Loop tuning				
3.6	Limitations				
3.7	Implementation				
ARTIF		NTELLIGENT	24		
4.1	Introduction				
4.2	Artificial Intelligence in Power Engineering				
	4.2.1	Expert Systems	24		
	4.2.2	Artificial Neural Networks	25		
	4.2.3	Genetic Algorithms	25		
	4.2.4	Fuzzy Systems	26		
	4.2.5	Hybrid System	26		
	4.2.6	Integration of AI in Power Systems	27		
4.3	Fuzzy Logic				
	4.3.1	Fuzzy Subsets	27		
	4.3.2	Fuzzy Predicates	28		
	4.3.3	Fuzzy Quantifiers	28		
	4.3.4	Fuzzy Truth Values	28		
	4.3.5	Fuzzy Modifiers	28		
	4.3.6	Fuzzy relational operators	29		
	4.3.7	Basic Fuzzy Sets Relations	29		
		4.3.7.1 Definitions	29		
		4.3.7.2 Basic Fuzzy Operations	30		
	4.3.8	Steps for Application of Fuzzy Set Theory	33		
4.4	Fuzzy Logic in Power System				
	4.4.1	Fuzzy logic in Planning	35		
	4.4.2	Fuzzy logic in Operation areas	35		
	4.4.3	Fuzzy logic in Control areas	37		