

CONTENTS

APPROVAL PAGE	ii
SELF DECLARATION AGAINST PLAGIARISM	iii
ABSTRACT	iv
ACKNOWLEDGEMENTS	v
PREFACE.....	vi
CONTENTS.....	vii
LIST OF FIGURES	ix
LIST OF TABLES	xi
CHAPTER I	1
1.1 Background	1
1.2 Problem Identification.....	3
1.3 Research Objectives.....	3
1.4 Hypothesis.....	4
1.5 Scope of Work	4
1.6 Research Methodology	5
CHAPTER II.....	7
2.1 Electric Vehicle (EV)	7
2.2 BLDC Motor.....	7
2.3 Regenerative Braking	8
2.4 Battery Degradation	10
2.5 Control System	11
2.6 Fuzzy Logic Control	12
2.7 Adaptive PID Control.....	14
2.8 Hybrid PID-Fuzzy Control	15

2.9	Metric Comparison	16
CHAPTER III		18
3.1	System's Model and Scenario	18
3.2	Simulation Scenario	22
3.3	Data Collection Scenarios.....	24
3.4	Analysis Scenario	25
CHAPTER IV		27
4.1	System Testing.....	27
4.2	Regenerative Braking System with No Control	30
4.3	Regenerative braking System with Fuzzy Logic Control	33
4.4	Regenerative Braking System with Adaptive PID	35
4.5	Regenerative Braking System with Hybrid Fuzzy-PID.....	38
4.5.1	SetPoint : 100, OutputRPM > 30 ON	38
4.5.2	SetPoint : 100, OutputRPM >10 ON	40
4.6	Summary of Results	44
CHAPTER V		49
REFERENCES		51