

CONTENTS

APPROVAL PAGE

SELF DECLARATION AGAINST PLAGIARISM

ABSTRACT	iv
ACKNOWLEDGMENTS	v
PREFACE	vi
CONTENTS	vii
LIST OF FIGURES	x
LIST OF TABLES	xi
LIST OF ABBREVIATION	xii
I INTRODUCTION	1
1.1 Background	1
1.2 Problem Identification	2
1.3 Objective	2
1.4 Scope of Work	3
1.5 Research Methodology	3
1.6 Stucture of Thesis	3
ACHIEVEMENT	1
II BASIC CONCEPTS	5
2.1 Brain Computer Interface (BCI)	5
2.1.1 BCI Modality	5
2.2 EEG Based BCI	6
2.3 Electroencephalography	6
2.4 Channel Selection	8
2.5 Spatial Selection	8
2.5.1 Energy Extraction	8

2.5.2	Energy Selection	9
2.5.2.1	Automatic Spatial Selection	9
2.5.2.2	Manual Spatial Selection	9
2.6	Power Spectrum Density (PSD)	10
2.7	Gray Level Co-occurrence Matrix (GLCM)	11
2.8	Feature Selection	13
2.8.1	Genetic Algorithm	14
2.8.2	Mutual Information	14
2.8.3	Chi- Square	15
2.9	Artificial Neural Network (ANN)	15
2.9.1	Back Propagation	16
III RESEARCH METHODOLOGY		17
3.1	Research Framework	17
3.2	Data Acquisition	18
3.3	Channel Selection	20
3.4	Signal Feature Extraction	21
3.5	Energy Distribution Image	21
3.6	Pre-processing Image	22
3.7	Image Feature Extraction	22
3.8	Feature Selection	23
3.9	Classification	25
IV RESULTS AND ANALYSIS		27
4.1	Research Phases	27
4.2	Result and Analysis of EEG Signal	29
4.3	Analysis of Signal EEG system and Energy Distribution Image without Channel Selection	31
4.4	Result and Analysis Energy Distribution Image without Channel Selection	32
4.5	Analysis Energy Distribution Image with Channel Selection	35
4.6	Analysis Genetic Algorithm, Mutual Information, and Chi-Square as Feature Selection in Energy Distribution Image after Channel Selection	37
V CONCLUSIONS AND FUTURE WORKS		39
5.1	Conclusions	39
5.2	Future Works	40

REFERENCES	41
Appendices	44
0.1 Code	45
0.2 Energy Distribution Image Example	49