

CONTENTS

APPROVAL PAGE	II
SELF DECLARATION AGAINST PLAGIARISM	III
ABSTRACT	IV
ACKNOWLEDGEMENTS.....	V
PREFACE	VII
CONTENTS.....	VIII
LIST OF FIGURES	X
LIST OF TABLES.....	XII
CHAPTER I INTRODUCTION.....	1
1.1 BACKGROUND	1
1.2 PROBLEM IDENTIFICATION AND OBJECTIVE	3
1.3 SCOPE OF WORK.....	4
1.4 RESEARCH METHODOLOGY	4
1.5 HYPOTHESIS	5
1.6 STRUCTURE OF THE THESIS.....	6
CHAPTER II LITERATURE REVIEW AND BASIC THEORY	7
2.1 RELATED RESEARCH.....	7
2.2 ELECTROENCEPHALOGRAM (EEG).....	11
2.3 EVENT-RELATED POTENTIAL (ERP).....	12
2.4 FEATURE SELECTION	13
2.5 METAHEURISTIC ALGORITHM.....	13
2.5.1 Genetic Algorithm (GA)	14
2.5.2 Particle Swarm Optimization (PSO).....	16
2.5.3 Ant Colony Optimization (ACO)	18
2.5.4 Binary Stochastic Fractal Search (B-SFS).....	19
2.6 LOGISTIC REGRESSION	20
2.7 VOTING CLASSIFIER	21
2.8 VARIANCE INFLATION FACTOR (VIF).....	22

CHAPTER III SYSTEM MODEL AND RESEARCH DESIGN	23
3.1 MATERIALS.....	23
3.1.1 Respondent Criteria	23
3.1.2 Hardware Devices.....	23
3.1.3 Data Collection Preparation.....	24
3.1.4 Data Collection	26
3.2 DATASET.....	29
3.2.1 Independent Component Analysis (ICA).....	30
3.2.2 Filtering.....	32
3.2.3 ERP Class Labeling	32
3.3 SYSTEM MODEL	33
3.4 RESEARCH DESIGN	35
3.4.1 Testing Scenario Without Feature Selection	35
3.4.2 Testing Scenario with Feature Selection Using Metaheuristic Algorithms	35
3.4.3 Testing Scenario with Feature Selection Using Hybrid Metaheuristic	
Algorithm.....	36
CHAPTER IV PERFORMANCE EVALUATION.....	37
4.1 TESTING WITHOUT FEATURE SELECTION	37
4.1.1 Intra-Subject Results.....	37
4.1.2 Discussion of Results on Scenario 1	44
4.2 FEATURE SELECTION TESTING USING METAHEURISTIC ALGORITHMS.....	45
4.2.1 Intra-Subject Results.....	46
4.2.2 Discussion of Results on Scenario 2.....	54
4.3 FEATURE SELECTION TESTING USING HYBRID METAHEURISTIC ALGORITHM	55
4.3.1 Intra-Subject Results.....	56
4.3.2 Discussion of Results on Scenario 3.....	65
4.4 SUMMARY OF TESTING SCENARIO RESULTS	66
CHAPTER V CONCLUSION	68
REFERENCES.....	70