



**DESIGN AND DEVELOPMENT OF AN INTELLIGENT
HEARING ABILITY LEVEL ASSESSMENT SYSTEM
USING SOMATOSENSORY STIMULI**

by

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TABLE OF CONTENTS

THESIS DECLARATION	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	v
LIST OF TABLES	xii
LIST OF FIGURES	xv
LIST OF ABBREVIATIONS	xx
LIST OF SYMBOLS	xxii
ABSTRAK	xxiv
ABSTRACT	xxv
CHAPTER I INTRODUCTION	
1.1 Research Background	1
1.2 Design of an Intelligent Hearing Ability Assessment System	3
1.3 Problem Statement	4
1.4 Research Objectives	5
1.5 Scope of Thesis	7
1.6 Organization of Thesis	8
CHAPTER 2 LITERATURE REVIEW	
2.1 Introduction	10
2.2 Human Auditory System	11
2.3 Electroencephalogram	14
2.3.1 Auditory Evoked Potential	14

2.4	AEP Stimulus Effects	17
	2.4.1 AEP Stimulus Type and Duration	18
	2.4.2 Interstimulus Interval	21
	2.4.3 Effect of Stimulus Intensity and Frequency on AEP	21
2.5	Development of Hearing Threshold Detection from AEP	23
	2.5.1 AEP Signal Detection and Analysis	23
	2.5.2 Hearing Threshold Criterion	24
	2.5.3 Hearing Threshold Response	25
	2.5.4 Complete Characteristic AEP Measurement	27
2.6	Feature Extraction	29
	2.6.1 Parametric Modeling Techniques	30
	2.6.2 Non-Parametric Modeling Techniques	31
	2.6.2.1 Time Domain Features	32
	2.6.2.2 Frequency Domain Features	32
	2.6.2.3 Time-Frequency Domain Features	33
	2.6.3 Fractional Dimension	33
2.7	Classification of AEP	34
	2.7.1 ABR Classification Using Statistical Automation Methods	35
	2.7.2 ABR Classification Using Syntactic Methods	36
	2.7.3 ABR Classification Using Machine Learning Algorithms	36
2.8	Summary	42

CHAPTER 3 RESEARCH METHODOLOGY

3.1	Introduction	43
3.2	Aims of the Research	43
3.3	Research Design	44
3.4	Establishing Reliability and Validity of the Data	45
3.5	Participants Selection Criteria	47
3.5.1	Participant Selection Material and Apparatus	48
3.5.2	Procedure for Participant Selection using Audiometry	50
3.5.2.1	Participant Selection Procedure	52
3.5.3	Description of Participants	54
3.5.3.1	Normal Hearing Group	54
3.5.3.2	Abnormal Hearing Group	58
3.6	Research Material and Apparatus For Measuring AEP	61
3.6.1	EEG Amplifier For AEP Data Acquisition	62
3.6.2	Stimulus and Recording Parameters	64
3.7	Data Collection Procedures	64
3.7.1	Procedure for AEP Data Acquisition Protocol	65
3.7.1.1	Data Acquisition Protocol For AEP-HTR	65
3.7.1.2	Data Acquisition Protocol For AEP-HPR	69
3.8	AEP Database Formulation	71
3.9	Data Validation Using ANOVA Test	72
3.10	Summary	75

CHAPTER 4 FEATURE EXTRACTION ALGORITHMS FOR HEARING RESPONSE CLASSIFICATION

4.1	Introduction	76
4.2	Feature Extraction Methods	76
4.3	Parametric Modeling Feature Extraction	77
4.3.1	AR Model	78
4.3.2	Akaike Information Criterion	79
4.3.3	AR Pole-Tracking Feature Extraction Algorithm	84
4.4	Non-Parametric Modeling Feature Extraction	86
4.4.1	AEP Pre-processing Method	87
4.4.2	Segmentation and Overlapping	87
4.4.3	Filtering Using Custom Filters	88
4.5	Frequency Domain Features	89
4.5.1	Spectral Energy Feature	89
4.5.1.1	Feature Extraction Algorithm for Spectral Energy	91
4.5.2	Spectral Entropy Feature	94
4.5.2.1	Feature Extraction Algorithm for Spectral Entropy	96
4.5.3	Spectral Energy-Entropy Feature	98
4.5.3.1	Feature Extraction Algorithm for Spectral Energy-Entropy	100
4.6	Fractional Dimension Feature	102
4.6.1	Box-counting Method	103
4.6.1.1	Feature Extraction Algorithm Using Box-counting Method	104

4.6.2	Higuchi Method	105
4.6.2.1	Feature Extraction Algorithm Using Higuchi Method	107
4.6.3	Detrended Fluctuation Analysis Method	108
4.6.3.1	Feature Extraction Algorithm Using Detrended Fluctuation Analysis Method	110
4.7	Summary	111
CHAPTER 5	CLASSIFICATION ALGORITHMS FOR AEP HEARING RESPONSES	
5.1	Introduction	112
5.2	Choice of Classifiers	113
5.2.1	Static Neural Networks	114
5.2.2	Dynamic Neural Networks	116
5.3	Designing Neural Network Architecture	117
5.3.1	Training of Neural Networks	117
5.4	Particle Swarm Optimization Algorithm	119
5.5	Performance of a Classifier	122
5.6	Summary	124
CHAPTER 6	CLASSIFICATION OF AEP HEARING THRESHOLD RESPONSE USING PARAMETRIC MODELING TECHNIQUES	
6.1	Introduction	125
6.2	Estimation of AEP Hearing Stability Factors for Normal and Abnormal Participants	125
6.3	Effects of Hearing Frequency on Hearing Threshold Detection	151
6.4	Summary	155

CHAPTER 7 RESULTS AND DISCUSSION

7.1	Introduction	156
7.2	Classification of AEP-HTR using MFNN, ENN and PSONN	156
7.2.1	MFNN Classifier for AEP-HTR	157
7.2.2	ENN Classifier for AEP-HTR	165
7.2.3	PSONN Classifier for AEP-HTR	173
7.2.4	Discussion	180
7.3	Fractal Feature Classification of AEP-HTR using MFNN, ENN and PSONN	181
7.3.1	MFNN Classifier for AEP-HTR	182
7.3.2	ENN Classifier for AEP-HTR	186
7.3.3	PSONN Classifier for AEP-HTR	190
7.3.4	Discussion	195
7.4	Classification of AEP-HPR using MFNN, ENN and PSONN	197
7.4.1	MFNN Classifier for AEP-HPR	197
7.4.2	ENN classifier for AEP-HPR	207
7.4.3	PSONN classifier for AEP-HPR	215
7.4.4	Discussion	222
7.5	Fractal Feature Classification of AEP-HPR using MFNN, ENN and PSONN	224
7.5.1	MFNN Classifier for AEP-HPR	224
7.5.2	ENN Classifier for AEP-HPR	228
7.5.3	PSONN Classifier for AEP-HPR	232
7.5.4	Discussion	235

7.6	Summary	237
CHAPTER 8 CONCLUSION		
8.1	Introduction	239
8.2	Designing a Two-class Intelligent hearing Ability Level Assessment System	239
8.3	Designing a Five-class Intelligent Hearing Ability Level Assessment System	242
8.4	Future Work	244
REFERENCES		245
APPENDIX A		254
APPENDIX B		255
APPENDIX C		258
APPENDIX D		262
APPENDIX E		280
APPENDIX F		283
APPENDIX G		301
LIST OF PUBLICATIONS		304

LIST OF ABBREVIATIONS

AABR	Automated Auditory Brainstem Response
AAEP	Automated Auditory Evoked Potential
ABHS	Abnormal Hearing Subject
ABR	Auditory Brainstem Response
AEP	Auditory Evoked Potential
AHG	Abnormal Hearing Group
ANOVA	Analysis of Variance
AR	Auto Regressive
ARMA	Autoregressive Moving Average
ARX	Autoregressive model with an Exogenous Input
ASHA	American Speech Hearing Association
BAEP	Brainstem Auditory Evoked Potential
BFF	Box-counting Fractal Feature
BP	Backpropagation
BM	Box-counting Method
CA	Classification Accuracy
DFA	Detrended Fluctuation Analysis
DFFF	Detrended Fluctuation Fractal Feature
EEG	Electroencephalography
ENN	Elman Neural Network
EP	Evoked Potential
ERP	Event Related Potentials
FD	Fractal Dimension
FFT	Fast Fourier Transform
HTR	Hearing Threshold Response
HPR	Hearing Perception Response
HFF	Higuchi Fractal Feature
HM	Higuchi Method
HL	Hearing-threshold Lower
HU	Hearing-threshold Upper
HPL	Hearing Perception Level
ISEF	Independent Spectral Energy Feature

ISENF	Independent Spectral Entropy Feature
ISEENF	Independent Spectral Energy Entropy Feature
ISI	Inter Stimulus Interval
ICA	Individual Classification Accuracy
LLAEP	Long Latency Auditory Evoked Potential
MFNN	Multilayer Feedforward Neural Network
MLAEP	Middle Latency Auditory Evoked Potential
MMN	Mismatch Negativity
MA	Moving Average
NHG	Normal Hearing Group
NHS	Normal Hearing Subject
NN	Neural Network
PSO	Particle Swarm Optimization
PSO NN	Particle Swarm Optimization Neural Network
SBC	Spectral Band Combination
SBC EF	Spectral Band Combination Energy Feature
SBC ENF	Spectral Band Combination Entropy Feature
SBC EENF	Spectral Band Combination Energy Entropy Feature
SD	Standard Deviation
SPL	Sound Pressure Level
SNR	Signal to Noise Ratio
STFT	Short Time Fourier Transform
TEAOE	Transient Evoked Oto-acoustic Emissions
VEP	Visually Evoked Potentials
WT	Wavelet Transform

NO.	LIST OF FIGURES	PAGE
1.1	Block diagram of an intelligent hearing ability level assessment system	4
2.1	Structure of the ear	12
2.2	A sound stimulus passes through auditory pathways in the brain	13
2.3	Different types of auditory evoked potential signals	15
3.1	Experimental setup for behavioral audiometry screening test	50
3.2	A flowchart: Participant selection using audiometry system	51
3.3	Audiometric test results for NHG	57
3.4	Audiometric test results for AHG	60
3.5	Experimental setup for AEP system	62
3.6	Electrode position from International 10-20 Standard	63
3.7	Procedure for AEP-HTR protocol flowchart	67
3.8	Procedure for AEP-HPR protocol flowchart	70
4.1	Block diagram of parametric and non-parametric features	77
4.2	Plot on the z -plane of the poles for 10 normal hearing participants (Electrode location: T3, left ear)	80
4.3	Plot on the z -plane of the poles for 10 normal hearing participants (Electrode location: T3, right ear)	81
4.4	Plot on the z -plane of the poles for 10 abnormal hearing subjects (Electrode location: T3, left ear)	81
4.5	Plot on the z -plane of the poles for 10 abnormal hearing subjects (Electrode location: T3, right ear)	82
4.6	Block description of the AR pole-tracking algorithm	83
4.7	A flowchart of Procedure for non-parametric feature extraction algorithms	86
5.1	Block diagram of a typical signal classification system	112

5.2	A static feedforward neural network	115
5.3	A dynamic feedback neural network	116
5.4	A flowchart for training the ENN using PSO algorithm	122
6.1	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 500 Hz, Electrode location: T3, left ear)	126
6.2	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 500 Hz, Electrode location: T3, right ear)	127
6.3	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 500 Hz, Electrode location: T3, left ear)	127
6.4	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 500 Hz, Electrode location: T3, right ear)	128
6.5	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 500 Hz, left ear)	130
6.6	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 500 Hz, right ear)	131
6.7	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 1000 Hz, Electrode location: T3, left ear)	132
6.8	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 1000 Hz, Electrode location: T3, right ear)	133
6.9	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 1000 Hz, Electrode location: T3, left ear)	133
6.10	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 1000 Hz, Electrode location: T3, right ear)	134
6.11	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 1000 Hz, left ear)	136
6.12	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 1000 Hz, right ear)	137
6.13	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 2000 Hz, Electrode location: T3, left ear)	138

6.14	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 2000 Hz, Electrode location: T3, left ear)	139
6.15	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 2000 Hz, Electrode location: T3, left ear)	139
6.16	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 2000 Hz, Electrode location: T3, right ear)	140
6.17	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 2000 Hz, left ear)	142
6.18	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 2000 Hz, right ear)	143
6.19	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 4000 Hz, Electrode location: T3, left ear)	144
6.20	Plot on the z -plane of the poles from a normal hearing participant (Hearing frequency: 4000 Hz, Electrode location: T3, right ear)	145
6.21	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 4000 Hz, Electrode location: T3, left ear)	145
6.22	Plot on the z -plane of the poles from an abnormal hearing participant (Hearing frequency: 4000 Hz, Electrode location: T3, right ear)	146
6.23	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 4000 Hz, left ear)	148
6.24	Box plot for the hearing-threshold values of normal and abnormal hearing participants (Hearing frequency: 4000 Hz, right ear)	149
6.25	Mean HL values for normal and abnormal hearing participants	153
6.26	Mean HU values for normal and abnormal hearing participants	153
7.1	Comparison of mean classification accuracy for MFNN models for left ear (ISEF, ISENF and ISEENF)	163
7.2	Comparison of mean classification accuracy for MFNN models for right ear (ISEF, ISENF and ISEENF)	164
7.3	Comparison of mean classification accuracy for MFNN models for left ear (SBCEF, SBCENF and SBCEENF)	164

7.4	Comparison of mean classification accuracy for MFNN models for right ear (SBCEF, SBCENF and SBCEENF)	165
7.5	Comparison of mean classification accuracy for ENN models for left ear (ISEF, ISENF and ISEENF)	171
7.6	Comparison of mean classification accuracy for ENN models for right ear (ISEF, ISENF and ISEENF)	171
7.7	Comparison of mean classification accuracy for ENN models for left ear (SBCEF, SBCENF and SBCEENF)	172
7.8	Comparison of mean classification accuracy for ENN models for right ear (SBCEF, SBCENF and SBCEENF)	172
7.9	Comparison of mean classification accuracy for PSONN models for left ear (ISEF, ISENF and ISEENF)	178
7.10	Comparison of mean classification accuracy for PSONN models for right ear (ISEF, ISENF and ISEENF)	178
7.11	Comparison of mean classification accuracy for PSONN models for left ear (SBCEF, SBCENF and SBCEENF)	179
7.12	Comparison of mean classification accuracy for PSONN models for right ear (SBCEF, SBCENF and SBCEENF)	179
7.13	Comparison of classification accuracy for MFNN models for left ear (BFF, HFF and DFFF)	185
7.14	Comparison of classification accuracy for MFNN models for right ear (BFF, HFF and DFFF)	186
7.15	Comparison of classification accuracy for ENN models for left ear (BFF, HFF and DFFF)	189
7.16	Comparison of classification accuracy for ENN models for right ear (BFF, HFF and DFFF)	190
7.17	Comparison of classification accuracy for PSONN models for left ear (BFF, HFF and DFFF)	194
7.18	Comparison of classification accuracy for PSONN models for right ear (BFF, HFF and DFFF)	194
7.19	Comparison of mean classification accuracy for MFNN models for left ear (ISEF, ISENF and ISEENF)	204

7.20	Comparison of mean classification accuracy for MFNN models for right ear (ISEF, ISENF and ISEENF)	205
7.21	Comparison of mean classification accuracy for MFNN models for left ear (SBCEF, SBCENF and SBCEENF)	205
7.22	Comparison of mean classification accuracy for MFNN models for right ear (SBCEF, SBCENF and SBCEENF)	206
7.23	Comparison of mean classification accuracy for ENN models for left ear (ISEF, ISENF and ISEENF)	212
7.24	Comparison of mean classification accuracy for ENN models for right ear (ISEF, ISENF and ISEENF)	213
7.25	Comparison of mean classification accuracy for ENN models for left ear (SBCEF, SBCENF and SBCEENF)	213
7.26	Comparison of mean classification accuracy for ENN models for right ear (SBCEF, SBCENF and SBCEENF)	214
7.27	Comparison of mean classification accuracy for PSONN models for left ear (ISEF, ISENF and ISEENF)	220
7.28	Comparison of mean classification accuracy for PSONN models for right ear (ISEF, ISENF and ISEENF)	221
7.29	Comparison of mean classification accuracy for PSONN models for left ear (SBCEF, SBCENF and SBCEENF)	221
7.30	Comparison of mean classification accuracy for PSONN models for right ear (SBCEF, SBCENF and SBCEENF)	222
7.31	Comparison of classification accuracy for MFNN models for left ear (BFF, HFF and DFFF)	227
7.32	Comparison of classification accuracy for MFNN models for right ear (BFF, HFF and DFFF)	228
7.33	Comparison of classification accuracy for ENN models for left ear (BFF, HFF and DFFF)	231
7.34	Comparison of classification accuracy for ENN models for right ear (BFF, HFF and DFFF)	231
7.35	Comparison of classification accuracy for PSONN models for left ear (BFF, HFF and DFFF)	234
7.36	Comparison of classification accuracy for PSONN models for right ear (BFF, HFF and DFFF)	235

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LIST OF SYMBOLS

δ	Delta band
θ	Theta band
α	Alpha band
β	Beta band
γ	Gamma band
μV	Micro volt
T	Temporal Lobe
p	poles
z	zeros
Hz	Hertz
dB	decibel
HL	Hearing level
Ω	Ohm
ms	Milli second
μs	Micro second
K Ω	Kilo ohm
$a(k)$	AR coefficient
k	Gain factor
N	Data length
X_i^j	AEP signal corresponding to the i^{th} frame of the j^{th} channel
H(z)	Transfer function

Xn_i^c	Normalized data value
X_i^c	data to be normalized
X_{\min}	Minimum value
X_{\max}	Maximum value
$d(z)$	Characteristic equation
p, q	real roots, pair of complex roots
M_{\max}, M_{\min}	Maximum and Minimum magnitude of the roots
H_u, H_l	Upper and Lower hearing threshold factors
X_i	i^{th} Swarm particle
V_i	Velocity of i^{th} swarm particle
P_i	Best previous location of i^{th} swarm particle
P_g	Best global location of i^{th} swarm particle

NO.	LIST OF TABLES	PAGE
2.1	Summary of AEP recording parameters	21
2.2	Summary of reviewed AEP studies	39
3.1	Participant selection criteria for groups of participants	48
3.2	Participant selection apparatus for groups of participants	49
3.3	Group with normal hearing for the left ear ($n = 24$): Average hearing threshold level (dBHL)	55
3.4	Group with normal hearing for the right ear ($n = 24$): Average hearing threshold level (dBHL)	56
3.5	Group with abnormal hearing for the left ear ($n = 5$): Average hearing threshold level (dBHL)	58
3.6	Group with abnormal hearing for the right ear ($n = 5$): Average hearing threshold level (dBHL)	59
3.7	Apparatus used for AEP data acquisition	61
3.8	Stimulus recording parameters for behavioral threshold and AEP threshold estimation	64
3.9	Anova test results for NHG	74
3.10	Anova test results for AHG	74
4.1	Spectral band combination feature set	100
5.1	A Typical Confusion matrix	122
6.1	Hearing-threshold factors for normal and abnormal hearing participants (500 Hz)	129
6.2	Hearing-threshold factors for normal and abnormal hearing participants (1000 Hz)	135
6.3	Hearing-threshold factors for normal and abnormal hearing participants (2000 Hz)	141
6.4	Hearing-threshold factors for normal and abnormal hearing participants (4000 Hz)	147
7.1	Spectral band combination features (AEP-HTR)	158

7.2	Comparison of MFNN architecture for gamma band feature (AEP-HTR)	159
7.3	Comparison of MFNN architecture for SBC2 feature (AEP-HTR)	160
7.4	Comparison of MFNN architecture for SBC3 feature (AEP-HTR)	161
7.5	Comparison of mean classification accuracy for MFNN models (AEP-HTR)	162
7.6	Comparison of ENN architecture for gamma band feature (AEP-HTR)	167
7.7	Comparison of ENN architecture for SBC2 feature (AEP-HTR)	168
7.8	Comparison of ENN architecture for SBC3 feature (AEP-HTR)	168
7.9	Comparison of mean classification accuracy for ENN models (AEP-HTR)	169
7.10	Comparison of PSONN architecture for gamma band feature (AEP-HTR)	174
7.11	Comparison of PSONN architecture for SBC2 feature (AEP-HTR)	175
7.12	Comparison of PSONN architecture for SBC3 feature (AEP-HTR)	175
7.13	Comparison of mean classification accuracy for PSONN models (AEP-HTR)	176
7.14	Significance of gamma band, SBC2 ($\beta\gamma$) and SBC3 ($\alpha\beta\gamma$)	180
7.15	Comparison of MFNN architecture for fractal feature (AEP-HTR)	183
7.16	Comparison of classification accuracy for MFNN models (AEP-HTR)	184
7.17	Comparison of ENN architecture for fractal feature (AEP-HTR)	187
7.18	Comparison of classification accuracy for ENN models (AEP-HTR)	188
7.19	Comparison of PSONN architecture for fractal feature (AEP-HTR)	191
7.20	Comparison of classification accuracy for PSONN models (AEP-HTR)	192
7.21	Significance of fractal feature	196
7.22	Spectral band combination features (AEP-HPR)	199