# ANALYZING THE THETA STATE OF BRAINWAVE SIGNAL AFTER HR INTERVENTION USING EEG

This thesis is presented in partial to fulfillment for the award of the Bachelor of Electrical Engineering (Honours) UNIVERSITI TEKNOLOGI MARA SHAH ALAM MALAYSIA



MUHAMMAD FARIZ BIN SAMSUL Faculty of Electrical Engineering UNIVERSITI TEKNOLOGI MARA 40450 SHAH ALAM, MALAYSIA

### ACKNOWLEDGEMENT

Praises to ALLAH S.W.T, for the strength and blessing me through out the entire research and completion of this project. Peace is upon to Prophet Muhammad S.A.W, who gives light to mankind.

I would like to express my gratitude and sincere appreciation to my supervisor, Puan Ros Shilawani S Abd Kadir for her suggestions, guidance and invaluable advices throughout the preparation and completion of my project, special thanks to Associate Professor Zunairah Hj. Murat for her support and concern.

This projet wouldn't be possible without the helps from lots of people. Thank you to Miss Rosnah Kassim, technician of Biomedical Research and Development Laboratory for Human Potential for her cooperation and providing me with the informations as well as other resources regard to this project. I thank to all participants, colleagues, present and past, for their commitment and essential contributions to this research.

My deepest appreciation goes to my parent and family for their love, understanding and encouragement and being source of my inspiration.

Thank you

Muhammad Fariz Bin Samsul

# ABSTRACT

This research analyzing the Theta state of brainwave using EEG and Horizontal Rotation (HR). EEG signals were captured from 32 students for 3 sessions, beginning, middle and end of semester before and after they underwent HR using two-channel bipolar connection in a controlled environment. The signals were filtered and classified into four main frequency bands: Delta, Theta, Alpha and Beta. The Theta states of brainwave were taken out for analyses. Graphs were plotted and paired T-test analysis was used to show the correlation between the left and right brainwave before and after HR to verify the brainwave synchronization. Another test was done to show the student's brainwave behavior for 3 sessions, beginning, middle and end of semester. It was observed that after HR, brainwaves were more balanced for all three sessions. In conclusion, there was proven that HR could synchronize brainwave.

# **TABLE OF CONTENTS**

# CHAPTER

### PAGE

Declaration	i
Acknowledgement	ii
Abstract	iii
Table of Contents	iv
List of Figures	vii
List of Tables	viii
List of Abbreviations	ix

1

# INTRODUCTION

1.1	INTRODUCTION	1
1.2	SCOPE OF PROJECT	1
1.3	AIM OF PROJECT	2
1.4	ORGANIZATIONS OF PROJECT REPORT	2

2

#### LITERATURE REVIEW

2.1	BRAIN		
	2.1.1	What is Brain?	.4
	2.1.2	Brain Structure	7

## 2.2 ELECTROMAGNETIC WAVES

2.2.1	Fundamental of Electromagnetic Waves	10
2.2.2	Brain Waves Signal	12

2.3	BRAIN OPTIMIZATION AND	
	SYNCHRONIZATION SYSTEM (BOSS <sup>™</sup> ) &	
	ELECTROENCEPHALOGRAPHY	
	(EEG) SYSTEM	
	2.3.1 Brain Optimization and Synchronization	
	System (BOSS <sup>TM</sup> )	16
	I. Concept of Horizontal Rotation	17
	II. Components of BOSS <sup>TM</sup>	18
	III. Biophysical Basis of Motion Therapy	19
	IV. Electromagnetic Basis of BOSS <sup>TM</sup> Therapy	21
	a. Magnetic Mechanics	22
	b. Piezoelectric Mechanics	22
	c. Electrofield Mechanics	25
	2.3.2 Electroencephalography (EEG) System	28
	I. How is an EEG done?	29
ME	THODOLOGY	
3.1	INTRODUCTION	31
3.2		31
	3.2.1 Magnetic Induction for Clockwise	
	(CW)	32
	3.2.2 Magnetic Induction for Counterclockwise	
	(CCW)	33
3.3	Analysis Data Using SPSS and Microsoft Excel	34
RES	SULT AND DISCUSSION	
4.1	INTRODUCTION	35
	BEGINNING OF SEMESTER RESULT	37
	MIDDLE OF SEMESTER RESULT	39
	THE END OF SEMESTER RESULT	42