REPRESENTATION OF THE NORMAL AND ABNORMAL ELECTROGASTROGRAPHY (EGG) SIGNALS BASED ON INSTANTANEOUS FREQUENCY ESTIMATION

This project report is presented in partial fulfillment for the award of the

Bachelor of Engineering (Honors) in Electrical Engineering

UNIVERSITI TEKNOLOGI MARA

(MAY 2007)

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ACKNOWLEDGEMENT

First of all, praise is only to **Allah s.w.t** for His bounty and blessing upon us who have give me strength and ability to complete this project and report. May His blessing upon the **Prophet Muhammad s.a.w** and members of the family and companies.

The sincere and foremost acknowledgements go to those who have given their time and expertise to develop this project until end. Explicit thankfulness was given to my parents who gives their loves and support for me directly or indirectly in completing this project.

I would like to express my sincere appreciation to my supervisor, Puan Putri Aidawati Binti Ahmad for her suggestions, guidance and invaluable advice upon completing this project.

Thanks a lot to all lecturers for their space, information, cooperation and encouragement. Also thanks to my entire friend for their time and support, and giving ideas, comment and encouragement. This project wouldn't be possible without the helps from all of them.

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ABSTRACT

Gastrointestinal signals is the signal that is produced due to the electrical activity of the stomach. In this project, normal and abnormal electrogastrography (EGG) signals are analyzed using time-frequency analysis or namely Instantaneous Frequency (IF) estimation technique to extract the features that best describe the electrogastrography (EGG) signals. Central Finite Difference (CFD) and Instantaneous Energy (IE) estimation is the combination method of Instantaneous Frequency (IF) estimation used that plays an important role and concept in time-frequency analysis.

Central Finite Difference (CFD) is a single phase differencing operation that is used to estimate the discrete-time instantaneous frequency while Instantaneous Energy (IE) estimation is used to characterize the temporal behavior, which is the instantaneous energy of the signal that varies with time.

During the analysis, the varieties of the pattern data from all the EGG signals are observed using the Digital Signal Processing Toolbox in MATLAB mathematical software. The familiarity between the theoretical and simulation are distinguished and evaluated. Results demonstrated that the IF estimation technique can be used to characterize the EGG signals. It is found that the CFD technique is able to extract the important parameters of the EGG signals because it is able to detect and differentiate directly the change in frequency and energy of the particular signal.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

An electrogastrogram is a study in which the electrical current generated by the muscle of the stomach is sensed and recorded. Electrogastrography (EGG) describes the recording and interpretation of electrical activity of the stomach. It is a combination of signal and noise. The signals are dynamic, time varying, sometimes transient, mostly non-stationary.

To represent the electrogastrography signals, the time-frequency analysis technique, namely Instantaneous Frequency (IF) estimation is used to provide a method for analyzing and estimate the frequency variation of the EGG signals.

Instantaneous Frequency (IF) is an important concept in time-frequency analysis. There are many applications to provide accurate IF estimation. To date, the IF estimation has been used to detect the fundamental frequency of the signals.

Instantaneous Frequency (IF) estimation is the combination method of Central Finite Difference (CFD) and Instantaneous Energy (IE) estimation. Central Finite Difference (CFD) is a single phase differencing operation that is used to estimate the discrete – time instantaneous frequency while the Instantaneous Energy (IE) estimation is used to characterize the temporal behaviour, where the instantaneous energy of the signal that varies with time. The results may be used to distinguish normal and abnormal EGG signals.