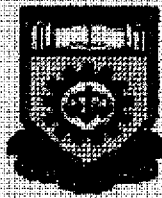


**IMAGE PROCESSING : ENHANCEMENT OF X-RAY FILM TO  
DETECT BREAST CANCER**

**Report presented in partial fulfilment for the award of the  
Bachelor in Electrical Engineering (Hons.)**

**Of**

**INSTITUT TEKNOLOGI MARA**



**DZUZLINDAH BINTI MUHAMAD ALIAS**  
School of Electrical Engineering  
**INSTITUT TEKNOLOGI MARA**  
40450 Shah Alam, Malaysia  
**DECEMBER 1996**

## **ACKNOWLEDGMENTS**

Alhamdulillah with the name of Allah s.w.t, the Most Gracious, Ever Merciful, who has give me the strength and ability to complete this project and report.

During the preparation of this project, I receive excellent help from many individuals. Some of this help was in the administrative, technical and logistical support, and here, I wish to express my deepest gratitude to my supervisor, En. Md Zaini Jamaludin for his guidance, ideas and patience in advising and assisting my project.

My appreciates also dedicate to Professor Madya Dr. Zulfiqar Md Annuar from the University Kebangsaan Malaysia (Radiologstic Department), and Radiographer Pn. Zurida from Hospital Besar Seremban and my lecture En. Kamal Zuhairi Zamli whose given me information, ideas and technical supports.

My gratitude also goes to my lectures, my friends especially Norraidah Zunaidak, and my family who were involve directly and indirectly in giving invaluable assistance, support, encouragement and understanding during this project.

Thank you to all and may Allah bless your good deeds.

## **ABSTRACT**

Many images were corrupted by interference during capturing, especially on x-ray film. To improve this images, the enhancement technique of digital image processing have been employed. The objective of enhancement technique is to process an image so that the result is more suitable than the original images for specific application. The method of image enhancement to be introduce in this project is Butterworth Highpass Filtering in Frequency Domain (BHPF). The image were then restored by histogram modification and histogram equalization technique. The algorithm and high language software such as Borland C++ 4.5 and Borland Visual Solution Pack were used to develop this techniques. The software has the ability to manipulate the images of common format like PCX , TIF and BMP

# **IMAGE PROCESSING: ENHANCEMENT OF X-RAY FILM TO DETECT BREAST CANCER**

<b><u>CONTENTS</u></b>	<b>Page No.</b>
<b>ACKNOWLEDGMENTS</b>	<b>i</b>
<b>ABSTRACT</b>	<b>ii</b>
<b>CONTENTS</b>	<b>iii</b>
<b>CHAPTER 1: INTRODUCTION</b>	
1.0 Introduction	1
1.1 Overview of Project	2
1.2 Scope of Work	3
1.3 Special X-ray Imaging For Radiographic	6
1.3.1 Mammography	6
1.3.2 CT Scanner (Computer Tomography)	7
1.3.3 PET (Positron Emission Tomography)	7
1.4 Why Mammography?	8
<b>CHAPTER 2: DIGITAL IMAGE PROCESSING THEORY</b>	
2.0 Digital Image Processing	9
2.1 An Introduction To Digital Image Processing	9
2.2 Basic Concepts	10

# INTRODUCTION

## 1.0 Introduction

Breast cancer is the leading cause of cancer death in women and has remained relatively constant of death from all cause for women in 40 to 50 age group[1]. Due to these, the screening program[2] has been introduced in order to detect the disease earlier. Currently there are two different methods of screening programs for women of certain age-groups i.e.: for breast cancer (mammography) and cancer of the cervix (cervical smears)[2].

Three popular methods have been applied to detect breast cancer: mammography, CT (Computer Tomography) Scanner and PET (Positron Emission Tomography). All of this method will produce the medical x-ray imaging that will be great help for doctors to make the diagnoses of this disease. Out of this three method at clinical environment, mammography method is generally employed because of the price and the cost of maintenance much lower than other method mention above.

The image produce by mammogram is a two-dimensional representation of a real physical three-dimensional scene. However, the x-ray image can be easily corrupted by interference during capturing. The corrupted image can be improve by using digital image processing technique that will be discuss further in this