## VEHICLE LICENSE PLATE RECOGNITION <br> SYSTEMS

This project report is presented in partial fulfillment for the award of the
Bachelor of Electrical Engineering (Hons)
Mara University of Technology

$\quad$| IMRAN BIN ISMAIL |
| :--- |
| Faculty of Electrical Engineering |
| Mara University of Technology |
| 40450 Shah Alam, Selangor |
| Malaysia |
| MARCH 2004 |

## ACKNOWLEDGEMENT

All praise be to the Al-Mighty Allah S.W.T, The Merciful and Beneficent for the strength and blessing through out the entire research and completion of the thesis. Peace be upon our prophet Muhammad S.A.W, whose has given light to mankind.

I wish to express my sincere appreciation and gratitude to my supervisor, Puan Norasimah Khadri for her guidance, counsels and for putting much effort through her useful advice to improve this project. I am also greatly indebted to all my panels Puan Ruhani Abdul Rahman and Puan Suhana Sulaiman for their time and effort for their valuable suggestion and criticism.

I am also would like to thanks to PM DR. Titik Khawa Abdul Rahman who had shown me the big picture of my work.

For all people who involved either directly or indirectly in this project, their contribution is highly appreciated. The kindness, corporation and support from all of the above mentioned people would always be remembered.

Thank You


#### Abstract

The purpose of the vehicle license plate recognition project is to recognize or identify vehicles. Vehicle license plates are meant to be recognized by people, especially government officials such as policemen and transport personnel. In current situation, we can identify all the information's related to the drivers from number plates. Vehicle's license plates that are authorized and registered are allowed to enter the campus premises. In this project, a database of vehicle license plate numbers that are authorized to enter the university grounds has been compiled. The project started with identification of a vehicle consists of three major parts namely sensing, image capturing and recognition of the license plate. A car is sensed and a signal is passed to the image-capturing receiver and triggers the video camera to take a snap using a high-speed shutter to reduce motion blur. Before image recognition takes place, the image needs to undergo pre-processing. This includes image cropping, image quantization and filtering and character segmentation. Only with all these image processing can the recognition of the numerals take place efficiently minimizing errors. In this project I have decided to choose neural network to recognize each character among other types of character recognition systems. This neural network has been trained off-line with a set of characters.


## TABLE OF CONTENTS

CHAPTER DESCRIPTION PAGE
DECLARATION ..... i
DEDICATION ..... ii
ACKNOWLEDGEMENT ..... iii
ABSTRACT ..... iv
TABLE OF CONTENT ..... vi
LIST OF FIGURES ..... x
LIST OF ABBREVIATIONS ..... xii
CHAPTER 1
INTRODUCTION
1.1 Introduction ..... 1
1.2 Project Objectives ..... 2
1.3 Neural Network Environment ..... 3
1.4 Database ..... 3
1.4.1 Microsoft Access ..... 4
1.5 Assumptions ..... 4
CHAPTER 2
DIGITAL IMAGE PROCESSING
2.1 Introduction ..... 6
2.2 Image Acquisition ..... 8
2.3 Preprocessing ..... 9
2.4 Recognition and Interpretation ..... 13
2.4.1 Segmentation ..... 13
2.4.1.1 Discontinuity ..... 14
2.4.1.2 Threshold ..... 17
2.4.1.3 Region Oriented Segmentation ..... 18
2.4.1.4 Edge Linking and Boundary Detection ..... 18
2.4.2 Feature Extraction ..... 24
2.5 Database Development ..... 26
CHAPTER 3
DESIGN AND IMPLEMENTATION
3.1 Hardware Implementation ..... 28
3.1.1 Digital Camera ..... 28
3.1.2 Personal Computer ..... 30
3.2 Software Implementation ..... 30
3.3 Noisy Numeral ..... 34
3.4 Finding Metric of All Rectangles ..... 36
3.5 Character Recognition ..... 38
3.5.1 Network Architecture ..... 39
3.5.2 Gathering Data for Training ..... 40
3.5.3 Training the Network ..... 42
3.5.4 Classifying the Output ..... 43
3.5.5 Database Verification ..... 43
CHAPTER 4
RESULT AND DISCUSSION
4.1 Introduction ..... 46
4.2 Result and Discussion ..... 46
4.2.1 Table ..... 47

