UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF PLATE RECOGNITION SYSTEM FOR AUTOMATED ENTRY MANAGEMENT

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation and Robotic) with Honours.

by

NASYIHIN BINTI NIK MOHAMAD ROSDI
B071510733
940916-08-6204

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING TECHNOLOGY

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Signature: …….

Supervisor : Ts. Ahmad Idil Bin Abdul Rahman

Signature: …….

Co-supervisor: Mr. Johar Akbar Bin Mohamat Gani

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ABSTRAK

Projek ini memperkenalkan tentang reka bentuk dan penghasilan sistem pengecaman nombor plat (NPR) untuk pengurusan akses kemasukan kenderaan secara automatik agar dapat meningkatkan sistem trafik yang efisien di kampus teknologi UTeM ketika waktu puncak. NPR memainkan peranan untuk melihat keadaan trafik dan membenarkan kemasukan kenderaan dari bilik kawalan. Oleh itu, sistem ini dapat mengurangkan kesesakan lalu lintas terutamanya pada waktu kemuncak iaitu 8 am dan 2 pm. NPR menyediakan data akses kemasukan kenderaan untuk analisis. Reka bentuk projek ini menitikberatkan penghasilan sistem memproses gambar dengan menggunakan beberapa kaedah algorithm melalui MATLAB dan 'Graphical User Interface' (GUI) berserta kamera web. Pengawal mikro akan diprogramkan untuk melaksanakan tugasan tertentu seperti menghantar signal kepada MATLAB untuk mengambil gambar dan menerima signal dari MATLAB untuk membenarkan akses masuk atau menolak akses. Status yang ditunjukkan dalam paparan LCD dan pengawal mikro akan menghantar maklumat kepada operator bilik kawalan untuk memperingatkan mereka tentang keadaan semasa melalui Paparan Grafik (GUI). Akhir sekali, pemprosesan imej dapat mengenal nombor plat atau tidak dan berhubung dengan mikrokontroller dalam sistem NPR.

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ABSTRACT

This project introduces the design and development of the Number Plate Recognition System (NPR) for automated entry management to increase the efficiency of traffic at UTeM Technology campus during the peak hours. The NPR plays an important role to monitor the traffic situation and allow the vehicle entrance access from the control room. Thus, it can decrease the congested traffic especially during the peak hours at 8pm and 2pm. The NPR provides the data of the entrance access for analysis. The design of this project will be focused on developing an image processing system in MATLAB and Graphical User Interface (GUI) with several algorithm and method by using web camera. The microcontroller will be programmed to a specific task where it send the signal to the MATLAB to capture the image and receive signal from the MATLAB to allow the entry access or access denied. The status shown in LCD display and the microcontroller will send the information to control room operators to alert them for the current situation via GUI. Lastly, the image processing is able to recognize the number plate or unable to recognize that interface with the microcontroller of NPR system.

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DEDICATION

To my beloved parents

Nik Mohamad Rosdi bin Mohamad

Norzakiah binti Kassim

Siblings

Nik Syafiq Nasrullah bin Nik Mohamad Rosdi

Muhammad Najwan bin Nik Mohamad Rosdi

Supervisor

Mr. Ahmad Idil bin Abdul Rahman

Co-Supervisor

Mr. Johar Akbar bin Mohamat Gani

Thank you very much for the support, love, encouragement, help and blessing.

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LIST OF SYMBOLS

%	-	Percentage
Pxl	-	Pixel (Resolution)
Hz	-	Hertz (Frequency)
ms	-	milisecond
km/h	-	Speed
ºC	-	Degree Celcius (Temperature)
Clc	-	Clear Command (MATLAB)

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LIST OF ABBREVIATIONS

HMI	Human Machine Interface
ANPR	Automated Number Plate Recognition
ALPR	Automated License Plate Recognition
AVI	Automated Vehicle Identification
CPR	Car Plate Recognition
VRI	Vehicle Recognition Identification
VLPR	Vehicle License Plate Recognition
RFID	Radio Frequency Identification Display
OCR	Optical Character Recognition
UTeM	Universiti Teknikal Malaysia Melaka
EPC	Electronic Product Code
PIN	Personal Identification Number
IFT	Indirect Fourier Transform
ITS	Intelligent Transportation System
RGB	Red Green Blue
AGL	Above Ground Level
TIFT	Tag Image File Format
BMP	Bitmap
JPEG	Joint Photographic Expert Group
JPG	Joint Photographic Group
LPR	License Plate Recognition

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ROI	Region of Interest
CCA	Connected Component Analysis
AR	Aspect Ratio
PC	Computer
LP	License Plate
AP	Affine Propagation
GUI	Graphical User Interface
CPU	Central Processing Unit
USB	Universal Serial Bus
IP	Ingress Protection
LED	Light Emitting Diode

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In this chapter, it will explain about the background of the project. Other than that, it is also describe the problem statement of the project with objective to solve the problem. Next, it will describe about the work scope of the project.

1.2 Project Background

Nowadays in Industrial Revolution 4.0, the technology that is applied must be upgraded to fulfil the requirement which is going further towards “Human Machine Interface” (HMI) handling automation. The “Automatic Number Plate Recognition” (ANPR) system is one of the recent technology application that is fully control by the computer system thus save human energy. Other than ANPR, it is also called as the “Automatic License Plate Recognition” (ALPR), “Automated Vehicle Identification” (AVI), “Car Plate Recognition” (CPR), “Vehicle License Plate Recognition” (VLPR) and “Vehicle Recognition Identification” (VRI). The idea of ANPR system is invented in year 1976. It was invented by the Police Scientific Development Branch in United Kingdom (Aalsalem and Khan, 2017).

ANPR was invented in 1976 at the Police Scientific Development Branch in the United Kingdom (Aalsalem and Khan, 2017). ANPR has a wide range of applications. For an example parking automation and parking security, access control for limiting access to areas, motorway road tolling, border control, time travel estimation and traffic offense such as speed trap. Besides, it is most widely accepted, easy to read by human

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and a user friendly mandatory identifier of motor vehicles. It requires computer systems to manage the database as well as processing information of the vehicle movements.

In the system of traffic management, the ANPR system were used to track the number plate of the vehicle by read the number plate and get the information from it. It can identify based on the user's identities and detects whether it is authorized or non-authorized member. ANPR can provide increased security, event management, control access and provides possibilities for data and analysis. There was a time where the entry management of an organization is started with manual registration by handwriting on the log book record. From the previous technology, a lot of organization used thumb print at the entrance. Then the technology was evolved into using Radio Frequency Identification Display (RFID) tags in replacing the magnetic stripe cards.

ANPR is a technology that requires "Optical Character Recognition (OCR) that enables the computer system to read vehicle registration plate from digital pictures. The number plate (license plate) of a vehicle is made of metal or plastic plate that attached to a motor vehicle for user identification. It is located at the front and back of the vehicle. The OCR is used to convert texts into machine-encoded texts, scanned the document or text on and saved in as an image and turned them into the electronic. ANPR is mainly software that can store the images captured which is the text from the license plate by using cameras.

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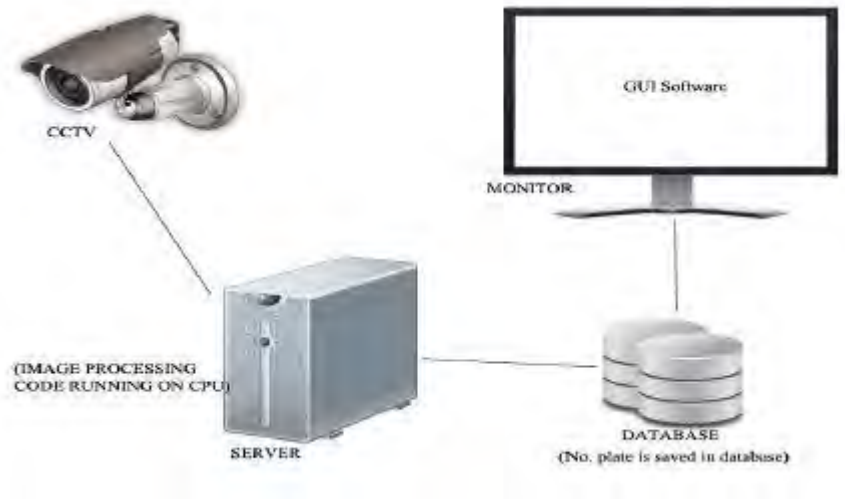

Figure 1.1: Architecture of ANPR system (Aalsalem and Khan, 2017)

The APNR is used to scan the plate number of each vehicle to control the entrance of authorized and unauthorized vehicles coming into the organization. It will avoid jams and provide efficient entrance management where the building or area security guard do not have to check the entrance of vehicle in detail at the gate. The system will record the entrance date and time of each vehicle at the entry.

1.3 Problem Statement

The number of students and staff at UTeM campus technology are increasing by years with limited areas. Thus, it will lead to traffic jams at the campus entrance gate. Besides, the monitoring and system management at the campus entrance is fully manual. The security guard have to check one by one the incoming car that enters the Technology Campus. They have to monitor whether the vehicle has the authorized vehicle sticker issued by the UTEM's Security Office. The procedure will take time since the car need to stop for a while so that the security guard can check whether the car has the authorized sticker or not.

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