UNIVERSITI TEKNIKAL MALAYSIA MELAKA

VEHICLE PLATE DETECTION SYSTEM

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

by

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FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

TECHNOLOGY

2018

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: Vehicle Plate Detection System

Sesi Pengajian: Semester 1 2018/2019

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Sistem pengesanan nombor plat kereta dihasilkan dengan harapan dapat mengurangkan bilangan kenderaan yang tidak dikenali memasuki premis universiti. Hal ini adalah untuk menjamin kewujudan suasana pembelajaran dan premis yang selamat kepada para pelajar dan staf fakulti teknologi kejuruteraan (FTK). Sistem ini akan mula bertindak dengan sendirinya apabila pengesan pergerakan kenderaan infrared (PIR) mengesan kewujudan kenderaan pada pagar keselamatan atau tempat tertentu. Kemudian, setelah penderia menghantar signal pada kamera, ianya akan menangkap gambar plat kenderaan berkenaan dan ianya akan melalui proses pengimejan supaya tulisan di atas no plat berkenaan dapat dibaca oleh sistem menggunakan program Matlab yang sesuai. Tulisan pada nombor plat kenderaan akan dikenal pasti menggunakan kaedah menyuai padan dengan templat yang telah disediakan. Segala informasi yang disimpan mengenai nombor plat kenderaan yang berdaftar akan terpapar pada GUI. Sekiranya ianya kenderaan berdaftar, motor servo yang digunakan sebagai palang akan terbuka dan sekiranya tidak, sebaliknya yang akan berlaku. Dengan adanya sistem, kadar kemasukan kenderaan yang tidak dikenali ke dalam kompaun FTK dengan harapan dapat dikurangkan serta kadar jenayah juga dapat dikurangkan.

ABSTRACT

The vehicle plate detection system is developed in the hope of reducing the amount of unauthorised vehicle from entering the premises such as university's compound. This is to ensure the secured environment for the staffs and students of the FTK. The system will automatically start to operate when the passive infrared motion sensor sensed the presence of vehicles at specific checkpoints. Then, the camera will be used to capture the image of the license plate of the vehicle. The image will then be processed by the system and this involves proper development of coding using the software Matlab. The characters on the plate will be extracted and recognised by using template matching method. The characters that has been identified on the vehicle plate will be cross matched with the information stored in the data base. If there is a match found, the vehicle is an authorised vehicle and will be allowed to enter the premises and if not, the system will alert the person in charge such the security guards. The passive infrared motion sensor is used to detect the presence of the vehicle at checkpoints and servo motor was used as the opening and closing of the gate. The GUI in the Matlab will be used to display the recognised characters on the vehicle plate. The USB camera will be used to capture the image of the vehicle plate. By using this system, it was hoped the number of unauthorised vehicles entering FTK premises can be reduced and the number of crimes occurs will be reduced.

DEDICATION

Alhamdulillah, praise to Almighty Allah S.W.T

This thesis is dedicated to:

My beloved family,

My Mother, Puan Raziah bin Mat Juda,

My Father, Zainal Roslan bin Othman,

My Lovely Brother, Danish Iskandar bin Zainal Roslan,

My Supervisor,

My beloved housemates,

My beloved friends,

And everyone involved.

Thank you for your encouragement and support.

May Allah bless you always.

ACKNOWLEDGEMENTS

Alhamdulillah, thank you Allah for his blessing. I am overwhelmed that in all humbleness and gratefulness to acknowledge my depth to all those who have helped me throughout this project. I would like to express my sincere gratitude and respect to my Supervisor, Encik Tg Mohd Faisal bin Tengku Wook for his kindness, encouragement, guidance and suggestions throughout these two semesters of being my supervisor. I also want to thank to my beloved parents because they keep giving me a lot of moral and financial support to keep me going so that I can pursue with my project and my studies. A big thank you to Noor Junisha, Siti Nur Radilah and Qkhuratu'aina Aishah for always supporting me and helping me in many possible ways. Thank you for these 4 years of lovely friendship. Thank you to Nur Farah Wahida binti Abdul Kadir for always helping me with my project and studies. Thank you for your kindness and friendship. Thank you to Aiman for helping me with the project. Thank you to Ng Chok Tong for always teaching me a lot of things and thank you for always assisted me when I had troubled with my project. Thank you to Intan Nadhirah, my lovely roommate, Muharnisyam, Maryam, Teresa and Syafiqah for being wonderful housemates and always being supportive. Thank you to all lecturers, friends and anyone who has been directly or indirectly involved in this project. Your helps and cooperation will never be forgotten. May Allah bless and reward them for their sincere, endeavour and contribution in the way of knowledge.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ANPR	- Automated Number Plate Recognition
GND	- Ground
GPIO	- General Purpose Input/Output
GPU	- Graphics Processing Unit
GUI	- Graphical User Interface
IR	- Infrared
LED	- Light Emitting Diode
MB	- Megabyte
OS	- Operating System
PCB	- Printed Circuit Board
PIR	- Passive Infrared Sensor
RAM	- Random-Access Memory
SD	- Secure Digital
USB	- Universal Serial Bus
UTeM	- University Teknikal Malaysia Melaka

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter discussed in detail about the purpose of the project. Several important will be discussed such as background of the project, its problem statement, objectives, scopes and significance of this project. The background of the project is written as to explain about the expectation of what will be done in this project and its expected result. Problem statement is used to discuss or determine the issues, which is seen as the problem that need to be solved in this project. Then, the objective of the project will be also be determined in this project and it is known as a specific result that need to be achieved in this project. Project scopes will be discussed about listing target goals of the project and tasks that need to be done. With the presence of scope project, the understanding regarding the project will be much clearer and easier to understand. Last but not least, the significance of the project will discuss about the project will bring benefits or impacts to other people.

1.1 Project Background

A system that can detect the images of the plate number will capture the image of the license plate of the vehicle. However, the vehicle plate needed to undergo image processing process. This system can be used for safety purpose such as detecting unauthorised plate number among staff and students before entering the university compounds. This is to increase or upgrade the level of security in UTeM compound. By

having this system, the process of checking the vehicles by security guards do not have to be done every single time before allowing any vehicle entering the university's compound and only come out when there is detection of unauthorised vehicle's plate number. Before using this system, every member of staffs and students of the university need to register their vehicle and identity information in data base. The data will be stored online, and the information of the vehicle owner can be seen by the security checkpoints. Then, at the security checkpoint, a security pole or bar will be placed with vehicle detection sensor. Once a sensor is detected, the camera will capture the image of the license plate and analyse it. It will cross match with the information in data base whether the vehicle detected was a registered vehicle or not. If it registered the pole will open but if not the pole will still closing and an alert will be warned to the security guards nearby to check and interrogate the unauthorised vehicles.

1.2 Problem Statement

There are several unauthorised vehicles keep entering the university's compound and some of them are not even the students or staffs of the university. This need to be prevented as this may affect the safety of students or even staffs of the university. It is also crucial to prevent any crimes to occur inside the university's compound because once it happens, it will quite hard to trace the person who had done the crime. To maintain the safe environment, a system needs to be created which is plate vehicle number detection system. Plate vehicle number recognition is a way to prevent unknown vehicles from coming inside the university's compound without permission. The plate number will be registered under the name of the student or staff and the identity information that belong to that registered plate number will register and save in data base. If the system cannot

match the plate number with the data base or if the system cannot recognise any vehicle plate number, it will alert the security guard nearby to be alerted with that vehicle. To prevent the opportunity for any unauthorised vehicle from entering the compound without permission, a security bar or pole will be placed. The presence of vehicle will be sensed by the sensor and it will automatically capture and analyse the image of the vehicle plate and identity of the vehicle will be identified. If the system cannot crossmatches the plate number with data base, the system will alert that it is not an unauthorised vehicle.

1.3 Objective

The objectives of this project are to:

1. To develop image processing system that able to detect and recognise the characters on the vehicle plates using Matlab.
2. To understand important steps of image processing when extracting the vehicle plate number.

1.4 Project Scope

This system was aimed to be applied in university's ground such as Fakulti Teknologi Kejuruteraan (FTK) security gates. This project is developed as to prevent or decrease the number of unauthorised vehicles from entering the university's compound without proper permission. This is done to assure the secure environment for the students and staffs. The system needs to be applied at the security checkpoint. Hence, the system will be designed and developed based on the scope stated using suitable equipment or devices. It will focus on capturing and analysing the image of license plate upon entering the security checkpoint. The image of vehicle plate will be captured right after a vehicle

detection sensor senses the vehicle's presence. The plate number will be recognised after undergoing several processes such as image processing, segmentation of plate image and recognition of characters written on the plate number. Several sample of data base will be created to test the efficiency of the system and whether it able to recognise the number plate with the one in the data base or not. Then, a system using Graphical User Interface (GUI) for the system will be developed to make easier for the people to use the system and able to view the information of vehicle plate detected.

1.5 Significance of the Project

This project is developed to decrease the number of unauthorised vehicles from entering FTK's compound. When the plate recognition system using Matlab is developed, it is easier for them to use it for safety purpose such as to detect the unauthorised vehicle. Other than that, system developed will enhance the security system of the place that uses this system by restricting the entrance of unauthorised vehicles. The uses of GUI allow much easier for people to use plate vehicle detection system and make it easier for them to retrieve the information of the owner of the vehicle.