DEVELOPMENT OF MALLS PARKING MANAGEMENT SYSTEM USING AUTOMATIC NUMBER PLATE RECOGNITION

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2021

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BACHELOR OF COMPUTER ENGINEERING TECHNOLOGY (COMPUTER SYSTEMS) WITH HONOURS

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A project report submitted
in fulfillment of the requirements for the degree of
Bachelor of Computer Engineering Technology (Computer Systems) with Honours

Faculty of Electrical and Electronic Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION

I declare that this project entitled " Development of Malls Parking Management System using Automatic Number Plate Recognition" is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : afifikmal

Name : Afif Ikmal bin Mohamad

Date : 23 JANUARY 2021

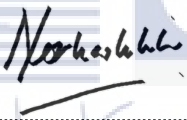
APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Engineering Technology (Computer Systems) with Honours.

Signature : 

Supervisor Name : Ts. Ahmad Fairuz bin Muhammad Amin

Date : 14 February 2021

Signature : 

Co-supervisor Name : Ts. Dr. Norhashimah binti Mohd Saad

Date : 13 February 2021

DEDICATION

To my beloved parents, I am grateful for their love, vision and sacrifice for the rest of my life. Without them, I probably wouldn't have gone this far, studying at university. I cannot negotiate the right words to accurately reflect my appreciation for your loyalty, support and belief in my ability to achieve my dream. Millions of thanks also to Yayasan Bank Rakyat for the education loan provided, it is very helpful financially throughout the university studies. Finally, I would like to thank everyone who contributed directly or indirectly to my final year project.

ABSTRACT

Parking has become an essential part of transports planning today. Shopping malls certainly must-have car parking for its customers but there are some problems encountered in conventional parking systems. Therefore, the proposed system is developed by using Automatic Number Plate Recognition (ANPR) to overcome the existing problems by providing a cashless payment method. The project is designed to recognize the number plate of the vehicle which passes through the system for authorization by using OpenCV library and Tesseract OCR for ANPR technique at entrance and exit gate barrier. Based on the parking charges, the system automatically deducting the specific amount of the available balance of registered users account when the vehicle is outgoing from parking lot. MySQL databases is used to saved all the data and connected to a web-based system. The experimental test to evaluate the proposed system functionality will only be conducted by prototyping which can be applied by using Raspberry Pi and low-cost components. The main challenge is to get accuracy in reading plate numbers correctly and better speed of execution. The ANPR process's performance time is less than 1.20 seconds to getting the extracted number plate and it takes below than 2.4 seconds delay to open the gates barrier. This project prototype idea very interesting for further development to apply at the actual parking system to be able to meet the community need.

ABSTRAK

Tempat letak kenderaan telah menjadi perkara penting dalam perancangan pengangkutan masa kini. Pusat membeli-belah pastinya mempunyai tempat letak kenderaan untuk pelanggannya tetapi terdapat beberapa masalah yang dihadapi dalam sistem konvensional kepada pengguna. Oleh itu, sistem yang dicadangkan dikembangkan dengan menggunakan Automatic Number Plate Recognition (ANPR) untuk mengatasi masalah yang ada dengan menyediakan kaedah pembayaran tanpa tunai. Projek ini dirancang untuk mengenali plat nombor kenderaan yang melewati sistem untuk mendapatkan kebenaran dengan menggunakan OpenCV dan Tesseract OCR untuk teknik ANPR di penghalang pintu masuk dan keluar. Berdasarkan caj parkir, sistem secara automatik menolak jumlah tertentu dari baki yang ada dari akaun pengguna berdaftar ketika kenderaan keluar dari tempat letak kereta. Pangkalan data MySQL digunakan untuk menyimpan semua data dan disambungkan ke sistem berasaskan web. Pengujian untuk menilai fungsi sistem yang dicadangkan hanya akan dilakukan dengan membuat prototaip yang dapat diterapkan dengan menggunakan komponen Raspberry Pi dan kos rendah. Cabaran utama adalah mendapatkan ketepatan dalam membaca nombor plat dengan betul dan kelajuan pelaksanaan yang lebih baik. Masa prestasi proses ANPR kurang dari 1.20 saat untuk mendapatkan plat nombor yang diekstrak dan memerlukan masa kurang dari 2.4 saat untuk membuka penghalang pintu pagar. Idea prototaip projek ini sangat menarik untuk pengembangan selanjutnya untuk diterapkan pada sistem tempat letak kereta yang sebenarnya agar dapat memenuhi keperluan masyarakat.

ACKNOWLEDGEMENTS

In the Name of Allah, the Most Gracious, the Most Merciful

First of all, for all that I have got since my birth, I wish to thank and praise Allah the Almighty, my Creator, my Sustainer. The completion of this project could not have been possible without the participation and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and acknowledged with gratitude. I would like to thank you to my beloved parent because of their support to give me a strength and motivated during completing this final year project. Next, special thanks should be given to Ts. Ahmad Fairuz Bin Muhammad Amin my project supervisor, Encik Aiman Zakwan bin Jidin, my previous project supervisor and Ts. Dr. Norhashimah binti Mohd Saad as my Co-Supervisor for her professional guidance and valuable support and to our lecturer for their useful and constructive recommendations on this project. Also, thanks to our friends who always support us, give us good advice and helped us a lot in finalizing this project. Our thanks also to people who have willingly helped us out with their abilities.

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LIST OF SYMBOLS AND ABBREVIATIONS

V	-	Voltage
cm	-	Centimeters
%	-	Percentage
IEEE	-	Institute of Electrical and Electronics Engineers.
ANPR	-	Automatic Number Plate Recognition
LPR	-	License Plate Recognition
IR	-	Infrared
AVI	-	Automatic Vehicle Identification
CPR	-	Car Plate Recognition
OCR	-	Optical Character Recognition
MATLAB	-	Matrix Laboratory
VEDA	-	Vertical Edge Detection Algorithm
LCD	-	Liquid Crystal Display
SQL	-	Structured Query Language
PIR	-	Passive Infrared Sensor
RGB	-	Red, Green, and Blue
HTML	-	Hyper-text Markup Language
RFID	-	Radio-Frequency Identification
GPIO	-	General Purpose Input/output
IoT	-	Internet of Things
CSI	-	Camera Serial Interface
VCC	-	Voltage Common Collector
GND	-	Ground
LED	-	Light-emitting diode
RDBMS	-	Relational Database Management System
CSS	-	Cascading Style Sheets
PHP	-	Hypertext Pre-processor
PSM	-	Projek Sarjana Muda
KNN	-	K-Nearest Neighbour

GUI	-	Graphical User Interface
sec	-	Seconds

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will explain the background of this project in the develop of Malls Parking Management System using Automatic Number Plate Recognition. This chapter includes background, problem statement, objectives, scope, and project significant of the project that will be discussed in detail.

1.2 Background

Parking has become an essential part of transports planning today. There's a lot of areas that are explosively growing with customers and visitors as a result of urban revitalization, uptown development, and the overall trend towards our society's increased mobility. In the research, the current car park management system at malls in Malaysia still using a printed paper ticket for payment purposes.

The Development of Malls Parking Management System using Automatic Plate Number Recognition is the best solution to replace parking tickets using paper. This project, which implements the new image processing technology in the parking management system, its Automatic Number Plate Recognition (ANPR), also known as License Plate Recognition (LPR), is an image processing that reads vehicle registration plate number. ANPR system plays an

important role in the real-life applications, such as parking management and traffic monitoring at the road, etc.

Furthermore, this project has been invented to automate the parking management system so that customers do not have to pick up parking tickets when entering the parking area and at the same time customers can avoid problems caused by their own negligence. Hence, the parking duration can be calculated and the payment will be made by automatically deducting the specific amount for the available balance of registered users. The approach can be used for time-saving and it is simply practical.

1.3 Problem Statement

Most of the parking system in a shopping mall used conventional parking system which requires a parking ticket for payment purposes. This will lead to high consumption of paper and will not support the green environment policy. Besides, the existing parking management systems require human efforts while the customer is at the entrance or exit gate of the parking because the customer of the shopping center still has to scroll down the window to take the parking ticket and need to get in line at payment machines. After all, the conventional approach causes delays and inconvenience to the customer as they have to deal with cash.

The parking coupon itself has brought out many inconvenience issues to customers while using the system as the printed ticket may get easily lost or damaged, which may cause the customers to pay for the penalty fees which usually cost above RM50. On top of that, customers require to go to the management department to pay the penalty fees or replace the defect parking ticket with a new one. Consumers sometimes leave their parking ticket in their car and they have to walk in a long distance to their car to retrieve the parking ticket and back to the payment machine

with a long queue again. Besides, deficiencies and damage to the payment machine can also cause customers to long queue for parking ticket payments. The shopping malls got many feedbacks from consumers due to wasting time in the parking lot due to such issues. Therefore, this idea is designed to overcome the problems that arise. The project's key function is to simplify the parking management system by utilizing ANPR while implementing a ticketless parking management system at the same time. Therefore, since the parking ticket use has removed in the parking management system, all parking ticket problems will be addressed immediately and the condition will offer ease to the consumer.

1.4 Project Objectives

This project aims to develop a parking system using ANPR and has a few objectives to be achieved. These objectives are:

- To study the detection and recognition process using the Automatic Number Plate Recognition (ANPR) method.
- To design & develop Malls Parking Management System using Automatic Number Plate Recognition .
- To evaluate the functionality and effectiveness of the proposed system.

1.5 Project Scopes

The proposed project will consist of four main activities to achieve all the objectives set at the beginning of the project.

a) Investigation on possible methods and solutions to resolve those inconvenienced issues in existing conventional parking systems in malls.

b) Formulation of the parking management system with Automatic Number Plate Recognition for identification and detection of plate number with single line character, black background colour, and standard font of Malaysia plate number. The ANPR process only recognises plate number of the static plate number and the data is acquired under a bright environment. There is no damaged plate number when the image captures.

c) Development of malls parking management system by using ANPR using Raspberry Pi as the controller which will be connected to cameras to detect and capture the vehicle number plate at both parking lot entrance and exit.

d) Evaluation and analysis on the functionality and effectiveness of the proposed system which is practical and eliminates disturbance and waste of time compare to the existing conventional parking system.

Due to some constraints such as the project financial and logistics, the experimental test to evaluate the proposed system functionality will only be conducted by prototyping which can be applied by using Raspberry Pi and low-cost components.