



Faculty of Computer Science and Information Technology

Car Tracking in Gated Residential Area Using Car Plate Recognition

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Bachelor of Computer Science with Honours
(Software Engineering)
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**CAR TRACKING IN GATED RESIDENTIAL AREA USING CAR PLATE
RECOGNITION**

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This project is submitted in partial fulfillment of the requirements for the degree of
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**PENJEJAKAN KERETA DI KAWASAN KEDIAMAN MENGGUNAKAN SISTEM
PENGENALAN PLAT KERETA**

GOH SHEA MING

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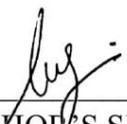
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ABSTRACT

Nowadays, the security of residential area is an important reason for people to choose to be part of the resident. Hence, most of the residential area have a guard to control the access to residential area. However, time is needed for guard to take down details of visitors manually and cause traffic to queue up at the entrance. In order to solve the problem, a car tracking system using car plate recognition is proposed. The purposes of this proposed system are to track a car timeline in residential area and reduce time the time used for taking record manually. The produced prototype is able to detect the car plate and recognize it. Waterfall model is used to develop the proposed system. This thesis introduces the background of the system, methodology used, design of system, system prototype, achievements of the system and the future enhancements that can be done. In the future, this system could be applied at the area which has vehicles to increase the security of that area.

ABSTRAK

Pada masa kini, keselamatan kawasan kediaman merupakan sebab penting bagi orang memilih untuk menjadi sebahagian daripada penduduk. Oleh itu, kebanyakan kawasan kediaman mempunyai pengawal untuk mengawal akses ke kawasan kediaman. Walau bagaimanapun, masa diperlukan untuk rekod butir-butir pelawat secara manual menyebabkan kesesakan laluan di pintu masuk. Untuk menyelesaikan masalah ini, sistem pengesanan kereta menggunakan pengenalan plat kereta dicadangkan. Tujuan sistem yang dicadangkan adalah untuk menjejaki jadual kereta di kawasan perumahan dan mengurangkan masa untuk mengambil rekod secara manual. Prototaip yang dihasilkan dapat mengesan plat kereta dan mengenalinya. Model *Waterfall* telah digunakan untuk membangunkan sistem yang dicadangkan. Tesis ini memperkenalkan latar belakang sistem, metodologi yang digunakan, reka bentuk sistem, prototaip sistem, pencapaian sistem dan peningkatan masa depan yang boleh dilakukan. Pada masa akan datang, sistem ini boleh digunakan di kawasan yang mempunyai kenderaan untuk meningkatkan keselamatan kawasan tersebut.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

A condominium is a private place for its residents. Hence, there is access control to ensure the security and privacy of the residents. Vehicle or car is part of the access control of condominium. The security guard of the condominium playing an important role to keep the residential area safe. The security guard has to record every visitor's vehicle before and after entering the condominium compound. It is a way to ensure the security of the condominium area, but this can incur a significant delay to visitors or residents while waiting security guard takes down the details every time. Frequent visitors can be parents who send their children to a babysitter in the morning and fetch they back after work, can be a boyfriend who visits his girlfriend regularly, or can be a family member who visits their parents once in a week. Besides, visitors can cause traffic to queue up at the entrance as the guard is taking down the details manually. This issue will be more serious during rush hour, such as before and after office hours. On average, it will take around five minutes to write down the details of a visitor and ask for the purpose of the visit. Therefore, a car plate recognition system can be a more convenient way by taking a record using a camera.

Moreover, there is no car tracking function in the residential area. Some selfish people might park their car at a parking lot which was not designed for them. This scenario is common at the parking lot near to an elevator. Hence, with a car tracking system, residents will increase their awareness of parking at their parking lot to avoid getting fine. Furthermore, car tracking timeline can be supporting information when the crime happened in the residential area.

1.2 Problem Statement

When a visitor enters the condominium area, it will incur a significant delay to residents. This is because the security guard has to take down details manually and causes traffic to queue up at the entrance. Moreover, the condominium area has an issue with monitoring cars because there is no timeline record of the car.

1.3 Aims and Objectives

The main objective of this project is to design and develop a car plate tracking system that can track the timeline of a car in a condominium area.

Other objectives include:

1. To reduce the time used for taking record manually.
2. To track the use of guest parking lot.
3. To record the illegitimate use of private parking lot.

1.4 Brief Methodology

Methodology that is going to use in this project is Waterfall model. Waterfall model was named after its sequential phases that are arranged in a downward fashion, similar to actual waterfalls, representing the various steps of software development from one end to the other. The reasons for choosing Waterfall model in this project are its sequential nature suitable for this unchanging project and allow transformation of information well by document all information in all phases.

Waterfall model is divided into five stages which are requirements analysis, design, implementation, verification, and maintenance. Figure 1.1 shows the phases of Waterfall model.

During requirements analysis phase, the goal of car plate tracking system has to be determined. Besides, information needed in order to develop the system has to be analysed. The information is then documented as a proposal which includes objectives, brief methodology, scope, and project schedule.

In design phase, features and operations of the system are designed in detail based on the information in the previous phase using Data Flow Diagram (DFD), Entity Relations Diagram (ERD), and others.

During implementation phase, the system is built based on the features and operations designed in design phase.

The system is then to be tested in verification phase. This is to ensure the accuracy and functionality of the system. Besides, the system is checked whether it meets the goal and objectives stated as in the proposal.

Lastly, the maintenance phase is to ensure the system operates at optimum levels of performance. When the system has an error or receives bad feedback from supervisor, system update will be carried out.

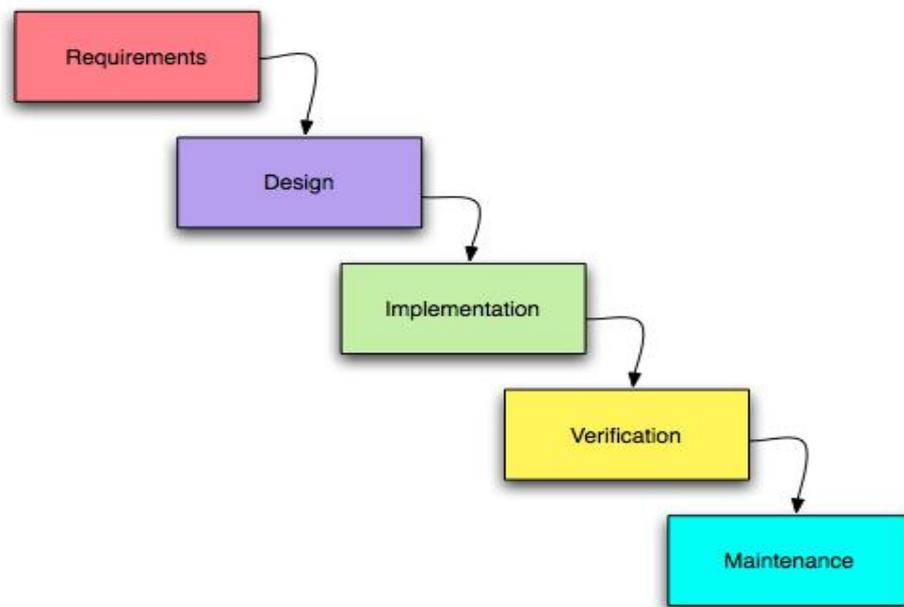


Figure 1.1. Waterfall Model (Hughey, 2009)

1.5 Scope

The car plate tracking system should be able to track the car plate using cameras. The system will record the time when a car plate is tracked and stored the time in a database. Besides, the system can list out the time record of the car plate tracked.

However, this system can apply to Malaysia's standard car plate only not for other countries because the pattern of the character is different. Moreover, the car plate used in the system testing is assumed in a good condition without any defects.

1.6 Significance of Project

The product of this project can be applied not only to condominium area but also to the area which has vehicles. For example, the system can apply to bank area to track the timeline of vehicles in case there is a bank robbery happens and provides the location of the thieves to the police.

1.7 Project Schedule

The project development timeline is shown by a Gantt chart. Microsoft Project 2010 is a software used to create the Gantt chart. Figure 1.2 is the Gantt chart of the project.

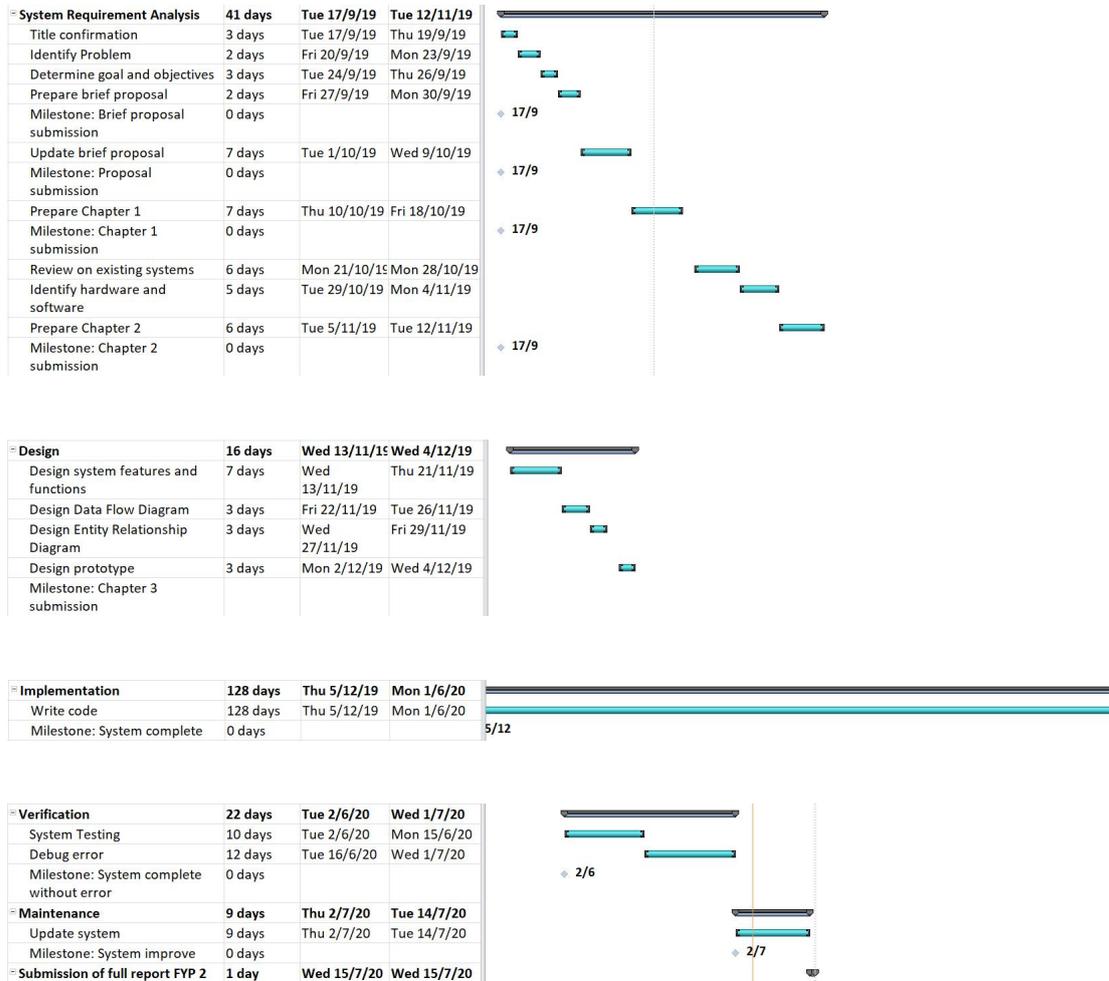


Figure 1.2. Gantt Chart of the project

1.8 Expected Outcome

A car plate tracking system will be developed to recognize car plate and track the car in the condominium area. A web-based system will be developed for guard or administrator of the condominium and visitors.

1.9 Report Outline

Chapter 2: Background Study / Literature Review

Chapter 2 is the review of the existing system based on articles, journals, or other academic resources. In this section, comparison between existing systems is required to bring out the value of the proposed project.

Chapter 3: Requirement Analysis and Design

In this chapter, methodology implemented in this system is explained in detail. Moreover, Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD) will be used to design the features and operations of the system.

Chapter 4: Implementation

Chapter 4 is describing the detail of the proposed system implementation. The detail and structure of the system are shown by using screenshot and interface layout.

Chapter 5: Testing

Chapter 5 is describing how the proposed system is been tested after successfully developed.

Chapter 6: Conclusion and Future Work

In chapter 6, a conclusion is made on the developed system and outlines the future work.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, three existing systems using License Plate Recognition (LPR) technology will be discussed. The three existing systems are Tiete Smart License Plate Recognition System, KiplePark, and Touchless. Moreover, a comparison between the three existing systems will be done. Besides, the hardware and software required in the proposed system will be listed out.

2.2 Reviews on Similar Existing Systems

Three similar existing systems that used as a reference for developing the project are TimeTec Smart License Plate Recognition System, KiplePark, and Touchless. These systems will be discussed in the following section. Besides, these systems will be compared with each other.

2.2.1 TimeTec Smart License Plate Recognition System

TimeTec Smart License Plate Recognition (LRP) System is a system used to automate vehicle access and improve the security of the residential area. This system is developed by a Malaysia company named TimeTec. TimeTec Smart LRP System is an ultra-modern technology that incorporates Optical Character Recognition (OCR) technology and LPR camera to convert a scanned image into a readable alphanumeric text at greatest accuracy. The system is designed to be standalone and it is also made integratable with its company-owned system or software such as cloud-based TimeTec Visitor Management System (VMS), TimeTec Access, TimeTec Parking, and i-Neighbour Smart Community System to ease entry

and exit of vehicles into and from an enclave (TimeTec Smart License Plate Recognition System, n.d.).

The first thing that needs to be done to activate TimeTec Smart LRP System is pre-registering users' license plate number in the system. When a vehicle approaches a barrier or boom gate, the TimeTec LPR Camera will read the license plate number of the vehicle. TimeTec Smart LRP will then read and matches the number with the database in the system. The gate will open automatically once the license plate number matches the one in the database.

Hardware required for TimeTec Smart LRP System are two LPR cameras for entry and exit, two LED panels, one computer, and one LPR gate relay board. LPR camera is used to read the license plate number of the vehicle whereas the LED panel is used to display the license plate number. A computer is used to register the vehicle license plate number and monitor the system. LPR gate relay board used to open the gate automatically when it is triggered.

The advantage of using TimeTec Smart LRP System is shortened vehicle access processing time. This system can expedite the process of vehicle access by giving instant access to authorized vehicles and block unauthorized ones from entering a residential area and all the audit trail will be intact and available for future references. Besides, the system provides accurate data in real-time all the time. The system which is connected to cloud-based technology, access to information is around the clock in a real-time manner, making monitoring effective. Furthermore, the system provides an analyzed report that gathers all data from each visitation. It would be used for better management as the property management can fully utilize the analyzed reports to arrange their security force.

However, TimeTec Smart LRP System has a drawback that is unable to track the vehicle in the residential area. The system is only designed for vehicle access control so, it is unable to verify the legitimate use of private parking lot. Therefore, the proposed system comes out to overcome the drawback.



Figure 2.1. TimeTec Smart LRP System (TimeTec Smart LRP System, n.d)

2.2.2 KiplePark

KiplePark is a mobile application that enables cashless payment of parking at selected premises. It is owned by Webonline Dot Com Sdn Bhd, a company that provides mobile payment.

KiplePark is integrated with advanced LPR technology which uses artificial intelligence (AI) to recognize the car license plate. The accuracy of recognizing a license plate using AI camera can be more than 99% (Tan, 2019). The AI camera is connected to a centralized management portal as well as e-wallet and digital payment systems (Tan, 2019).

First-time users have to register themselves by using KiplePark mobile application with their car license plate number. As the car approaches the gate, the AI camera will capture the license plate of the car. Through a mobile application, the driver will receive a digital ticket,