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DESIGN AND DEVELOPMENT OF SHIPPING ROUTE OPTIMIZATION AND TRACKING APPLICATION BASED ON ANDROID PLATFORM

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Computer Engineering Technology (Computer Systems) with Honours.

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: DESIGN AND DEVELOPMENT OF SHIPPING ROUTE OPTIMIZATION AND TRACKING APPLICATION BASED ON ANDROID PLATFORM

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I hereby, declared this report entitled DESIGN AND DEVELOPMENT OF SHIPPING ROUTE OPTIMIZATION AND TRACKING APPLICATION BASED ON ANDROID PLATFORM is the results of my own research except as cited in references.

Signature: .....

Author : AHMAD FARIS BIN RAMLI

Date: 13/02/2021

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 Computer Engineering Technology (Computer Systems) with Honours. The member of the supervisory is as follow:

Signature: ……

Supervisor: DR. MOHD SYAFIQ BIN MISPAN

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Co-supervisor: NOOR MOHD ARIFF BIN BRAHIN

ABSTRAK

Pada masa kini, syarikat pengeposan semakin lama semakin sibuk disebabkan kedai-kedai atas talian yang kian meningkat dari segi pembeli dan penjual dalam pada masa yang sama. Ini kerana proses pembelian secara online adalah lebih cepat dan mudah. Ditambah pula dengan pandemik yang melanda negara menyebabkan pengguna dilarang untuk keluar rumah semasa Restrict Movement Order (RMO). Mereka perlu duduk di rumah dan suhubungan dengan itu, semakin banyak peluang pekerjaan bagi penghantar barang. Walaubagaimanapun, terdapat masalah yang dihadapi kerana barang yang dihantar sangat banyak dan masa tidak mencukupi untuk menghantar dalam masa yang ditetapkan. Untuk mengatasi masalah ini, aplikasi mudah alih penghantaran yang cekap diperlukan. Dalam projek ini, kami membina aplikasi mobile bagi penghantaran berdasarkan platform Android yang bertujuan untuk mengoptimumkan jalan penghantar barang untuk mengurangi waktu penghantaran. Kami menggunakan algoritma genetik untuk menyelesaikan masalah dan menerapkannya dengan menggunakan API peta. Hasil telah diajukan dan prestasi telah dicatat.

ABSTRACT

Nowadays the post office is becoming increasingly busy as online shops simultaneously expand in terms of buyers and sellers. That is because the method of online shopping is faster and simpler. Moreover, a pandemic has infected this country that prohibits users from leaving during the Restrict Movement Order (RMO). They must stay and link to it at home creating more shippers' jobs. However, there is a problem because the parcels are delivered too much and the time to ship is not adequate. To overcome these issues, an efficient shipping mobile application is required. In this project, we developed shipping mobile application based on Android platform which aims to optimize the shipping route to reduce the delivery time. We used the genetic algorithm to solve the problem and implement it using the map API. The results have been filed and the performance already recorded.

DEDICATION

The thesis is entirely dedicated to my loved parents, who were my source of inspiration and helped us to give up, who are still offering their social, spiritual, emotional and financial support. My parents, sisters, relatives, mentors, acquaintances and colleagues especially Nursalsabiela binti Affendy Azam that were invited to complete this study and to offer their words of advice. And finally, to Allah SWT, I 'm grateful for your encouragement, determination, mind power, protection, expertise, and a healthy lifestyle. I give you all these things.

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O	-	Complexity
m	-	Mass
T	-	Period
$\boldsymbol{\pi}$	-	Expected count of select
$\boldsymbol{\ell}$	-	Chromosome
$\boldsymbol{P_S}$	-	Probability of selecting
n	-	Number of populations

LIST OF ABBREVIATIONS

ACO	Ant Colony Optimization
API	Application Program Interface
CPTs	Cross-platform Technologies
CSS	Cascading Style Sheets
ETA	Estimated Time of Arrival
GA	Genetic Algorithm
GPS	Global Positioning System
GUI	Graphical User Interface
HTML	Hypertext Markup Language
ICT	Information and Communications Technology
iOS	iPhone Operating System
IT	Information Technology
JS	JavaScript
OS	Operating System
SDLC	Systems Development Life Cycle
TSP	Traveling Salesman Problem
UX	User Experience

CHAPTER 1

INTRODUCTION

This chapter deals with a brief background of the project, problem statement, objectives, and scope of Shipping Route Optimization based on Android platform.

1.1 Background

Nowadays the use of the Internet and mobile devices undeniably had contributed the most in every single human daily life. Besides the increasing use of these modern technologies, e-commerce has only become more popular and continue to grow successfully (Haron *et al.*, 2017). Due to convenient and economical features, e-commerce becomes the most trend medium to shop without the need of traveling to a physical store at all and depend fully on courier service (Jalaluddin *et al.*, 2017).

To keep up with the pace upon the rapid development of technology, the courier must also drastically make improvements towards their services (Luo, Li and Mei, 2017). Delivery services play a significant role in cooperation and communities as inward and outward item occurs in the online shop every day (Jalaluddin *et al.*, 2017). Courier services are at the juncture of logistics and postal services, they have characteristics that distinguish them from each other, for example, the specified delivery time with accuracy to an hour, money-back guarantee, tracking functionality of the package in the tracking system and many more. Therefore, courier services are not only serving enterprises, manufacturing and companies but also captivating individual customers as well (Gulc, 2017).

The rising popularity of mobile technology and apps leads many businesses via software applications therefore, a thorough understanding of how to develop applications based on consumer preferences is competitively necessary (Tarute, Nikou and Gatautis, 2017). Furthermore, most digital companies also become mobile enterprises as mobile devices deliver a rich range of embedded sensors such as accelerometer, digital compass, gyroscope, GPS, microphone and camera (Francese *et al.*, 2015). The mobility and convenient features make mobile application becomes the user's first choice in an online platform.

Therefore, this project is proposed for the android application to be developed as a route optimization to help the courier deliver the goods to the customer in an optimized way. This helps to reduce the consumption of time and the quality of the goods. It also helps the customer by receiving a notification automatically when the courier approached the customer's location. This android application can be used by the courier that want to avoid traffic jam which are increases the time to deliver, money for fuel consumption and quality.

1.2 Objectives

The purposes that have been established for the solution of the problem set out in the list of problems are:

i. To design a courier service mobile application using the android platform.
ii. To develop courier delivery route optimization by using the genetic algorithm technique.
iii. To develop a user notification delivery system embedded in the courier services mobile application.

1.3 Problem Statement

Presently the business relies on the knowledge of the couriers themselves in sorting, packing and deciding the routes to go on as there are no specific technologies regarding optimizing process (Theeb, Manneh and Al-qadi, 2017). In Malaysia, the delivery process is not coordinated since the distributor has trouble identifying the best route from the state distribution center to the district distribution due to limited information in scheduling their journey in order to minimize the distance for delivery of postal and parcels (Jalaluddin et al., 2017). Moreover, most courier companies do provide track-and-trace on their websites, but they did not quite follow the easy tracking" expectations as the process is tedious (Haron et al., 2017).

Furthermore, the raises of uncertainty such as wrong address and drivers can lose time searching for the right address during delivery time affecting customers to wait for delivery at home and may even be delayed in delivery (Zenezini et al., 2018). The ubiquity of online shopping to make online transactions had resulted in postal and parcel systems are hardly able to deliver on time because of consumer demand relatively high (Jalaluddin et al., 2017).

Therefore, this project is proposed to solve the route scheduling for the courier delivery services in order to optimize resources and effectively reduce the cost. Furthermore, this project will critically find the best route to travel during the delivery service considering the distance and congestion in Melaka.

1.4 Project Scope

The scope is:

i. Customers who probably use the internet delivery services and the domestic courier service require an optimized route to supply goods are the target users for this project.

ii. The project will be carried out on the basis of the optimization algorithm.

iii. The system will help the courier worker to find the best route for each good in terms of time, cost and the worth of the wares.

iv. It is an Android application.

v. The program is created with the Android Studio and Java platform.

vi. The action language is in English.

1.5 Thesis Outline

This thesis is constructed as follows. Chapter 1 describes the main ideas of the project, mostly about the objectives, problem statement and project scopes. Next, Chapter 2 will brief more on theory and literature reviews that have been done. The studies are discussed that are related to this project where the information was retrieved via journal articles, papers and online sources. The methodology used to implement this project is discussed in Chapter 3 which includes the methods and techniques used in the programming, interface, and functions. Chapter 4 is where the tests, results and discussion included. Lastly, the summary for this project and recommendation suggestion is in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

A short overview and introduction to the key elements of the project are provided in this chapter. This chapter also addresses the related academic and journal papers already collected and reviewed for the implementation of this project.

2.1 Mobile Application

Smartphones have been part of people's lives and act as basic needs nowadays. As the Internet and smartphones are known for their simplicity, speed and multi-functionality, they also change the life habits and mode of operation, while also linking the website with mobile applications to provide people with more diversified app types. They also download various applications (Ho and Syu, 2010). Mobile apps include a smartphone or tablet program package that performs various user-friendly operations (Islam, Islam and Mazumder, 2010).

In recent years, the demand for mobile applications has gradually grown, with more and more software developers, content providers and advertising agencies joining this massive market positively and then growing mobile services or functions(Ho and Syu, 2010). Many citizens in developed countries, including America and Europe, cannot imagine leaving homes without smartphones, not only in advanced nations but also in emerging countries, mobile applications are fast-growing (Islam, Islam and Mazumder, 2010). Nonetheless, the device market is controlled by a range of different technology models, including various operating systems (OS) and software development platforms,

resulting in a spectrum of competitive business strategies led by different players (Hammershøj, Sapuppo and Tadayoni, 2010). Therefore, every mobile application should analyze extensively in this subtopic three characteristics.

2.1.1 Mobile Operating System

In the information technology (ICT) industries, platforms have also been used to effectively leverage technologies from diverse sources (Bresnahan, Orsini and Yin, 2014). There are many application platforms, but two are more distinguished by the success of Apple's iOS (iPhone Operating System) and Google's Android. (Goadrich and Rogers, 2011). These two platforms will be compared in this section as shown in Figure 2.1 which undoubtedly Google and Apple brand dominated the market.

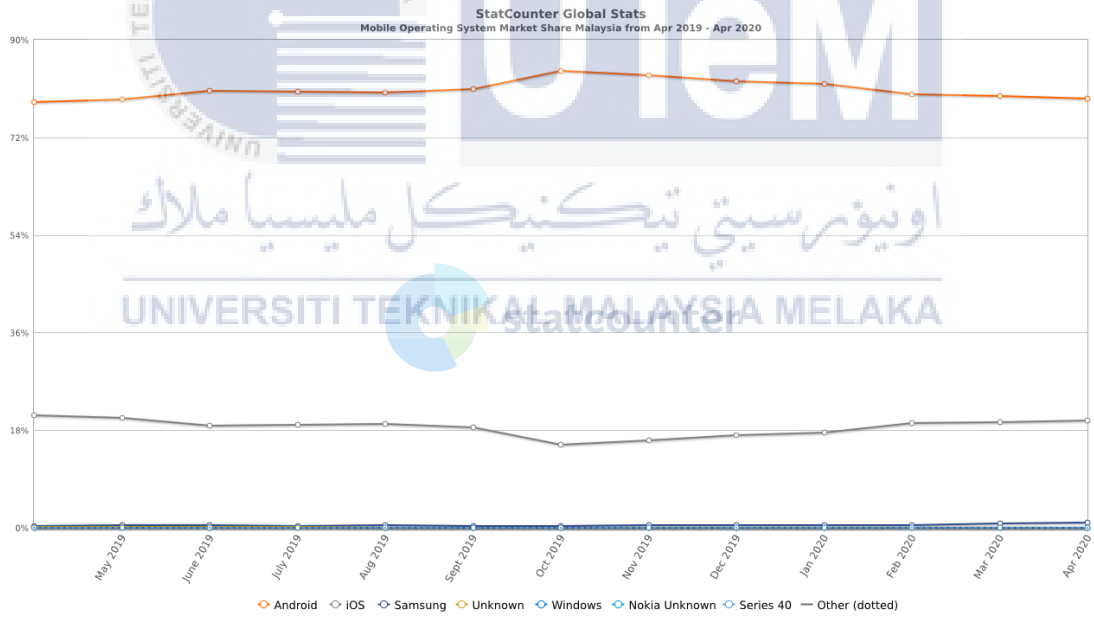

Figure 2.1 Mobile Operating System Market Share Malaysia(statcounter.com, 2019)