UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF BUS TRACKING SYSTEM USING ANDROID APPLICATION

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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DECLARATION

I hereby, declared this report entitled "Development of bus tracking system using Android application" is the results of my own research except as cited in references.

Signature : …….

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APPROVAL

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

……

(Project Supervisor)

ABSTRAK

Secara umum, perkhidmatan bas merupakan salah satu pengangkutan awam yang banyak digunakan oleh masyarakat. Namun, kebanyakan sistem pengesanan bas tidak memberi maklumat tentang bas dengan terperinci kepada pengguna kerana sistemnya hanya memberi maklumat berdasarkan spesifikasi sahaja. Hal ini telah menyebabkan pengguna marasa tidak selesa ketika menggunakan sistem pengesanan bas kerana mereka perlu mengguna pelbagai sistem pengesanan bas untuk mendapat maklumat yang lebih lanjut tentang bas. Oleh demikian, projek ini bertujuan untuk membuat satu sistem pengesanan bas berdasarkan aplikasi Andorid untuk memberi maklumat tentang bilangan penumpang di dalam bas dan juga masa nyata lokasi dan bilangan bas kepada pengguna aplikasi. Selain itu, projek ini menggunakan model waterfall bagi pembinaan software kerana flexibiliti model. Di samping itu, flowchart juga digunakan dalam pembinaan hardware. Tambahan lagi, satu aplikasi bagi sistem pengesanan bas telah dicipta bagi pengguna untuk mengesan bas. Aplikasi ini termasuk tiga interface bagi memberi pengguna mengesan bas, melihat maklumat bas dan juga lokasi bas dalam satu peta. Seterusnya, satu mekanisme untuk pengiraan penumpang dalan bas telah dicipta untuk mengira bilangan penumpang di dalam bas. Konklusinya, satu sistem pengesanan bas telah dicipta dan perfomasi sistem ini boleh ditingkatkan dengan menunjukkan laluan bas serta anggaran masa ketibaan kepada pengguna.

ABSTRACT

Generally, bus service is said to be one of the major transportation among all public transportation service. However, most of the existing bus tracking systems do not provide detail information of the bus as it only provides information which are related to its specification. This is very inconvenience as the user has to use different bus tracking system in order to know more information of the bus. Thus, this project is aim to develop an Android based bus tracking system that shows the number of passenger on board to the user and also to show some useful information such as the real-time location and the number of available bus to user. Furthermore, this project apply waterfall model for software development as it is less iterative and has flexible approach. Moreover, flowcharts were used in the development of the bus tracking device. Next, a bus tracking application is created for the user to track buses. The application includes three interfaces for the user to track a bus, view the bus information and also view the location of the bus on a map. In addition, a counting mechanism is implemented on the bus tracking device in order to count the passenger on board. In conclusion, a bus tracking system which shows the location, number of passenger and number of available bus is developed and the system can be further enhance by showing the route and estimated arrival time of the bus to the user.

DEDICATION

To My Parents

Thank you for your support and love throughout this project.

Your encouragement give me motivation.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

AJAX	**-**	**Asynchronous JavaScript and XML**
API	**-**	**Application Program Interface**
CDMA	**-**	**Code-Division Multiple Access**
EEPROM	**-**	**Electrically Erasable Programmable Read-Only Memory**
ETA	**-**	**Estimated Time of Arrival**
GPU	**-**	**Graphical Processing Unit**
GPRS	**-**	**General Packet Radio Service**
GPS	**-**	**Global Positioning System**
GSM	**-**	**Global System for Mobile**
ID	**-**	**Identity Document**
IDE	**-**	**Integrated Development Environment**
IOS	**-**	**IPhone Operating System**
OOP	**-**	**Object-Oriented Programming**
OS	**-**	**Operating System**
PC	**-**	**Personal Computer**
PHP	**-**	**Personal Home Page**
RF	**-**	**Radio Frequency**
RFID	**-**	**Radio-frequency Identification**
SDK	**-**	**Software Development Kit**
SIM	**-**	**Subscriber Identity Module**
SMS	**-**	**Short Message Service**
SSL	**-**	**Secure Socket Layer**
SQL	**-**	**Standardized Query Language**
TCP/IP	**-**	**Transmission Control Protocol/Internet Protocol**
TDMA	**-**	**Time-Division Multiple Access**

UART	**-**	**Universal Asynchronous Receiver-Transmitter**
USB	**-**	**Universal Serial Bus**
v3	**-**	**Version 3**

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will introduce the background of the bus tracking system and discuss the disadvantages of existing bus tracking system. Moreover, the objectives of this project are made and covered in this chapter by analyzing the disadvantages of existing bus tracking system. Lastly, the scope and requirements of the project are also mentioned in this chapter.

1.1 Background

In this era of globalization, bus service is said to be one of the major transportation which is used by public among all public transportation service especially in a city. According to the public transport performance statistic 2015 as shown in Figure 1, bus transportation has 347.6 million of passenger in year 2015 which is equivalent to 57.99% of total passenger who used public transport in that particular year.

Passenger numbers, million

	Railway	Tram	Under-ground	Bus, coach	Taxi	Air	Ferry to SI	TOTAL
1997	50,0	53,6	42,3	330,1	48,5	2,6	1,2	528,3
1999	53,2	55,5	49,5	338,1	51,0	2,8	1,4	551,5
2001	55,0	57,3	52,8	347,5	52,0	2,9	1,4	568,9
2002	57,7	56,1	54,9	345,4	52,0	2,7	1,5	570,3
2003	59,9	56,8	55,4	335,4	51,5	2,6	1,3	562,9
2004	60,1	56,6	55,4	326,8	52,1	2,8	1,4	555,3
2005	63,5	55,6	56,0	320,7	54,9	2,7	1,4	554,8
2006	63,8	52,8	56,8	318,6	58,1	2,8	1,4	554,2
2007	66,7	52,7	56,2	319,6	59,1	2,7	1,5	558,6
2008	69,9	53,9	57,6	331,4	59,5	2,7	1,5	576,5
2009	67,6	54,9	57,3	325,9	57,5	2,3	1,5	567,1
2010	68,2	54,5	57,1	339,8	57,0	2,2	1,6	580,3
2011	67,1	53,7	61,5	346,8	58,6	2,7	1,7	592,0
2012	68,2	57,2	62,2	351,8	58,0	2,7	1,6	601,6
2013	70,6	56,6	63,4	352,7	55,8	2,4	1,8	603,3
2014	71,9	55,5	62,1	349,4	54,4	2,5	1,8	597,5
2015	76,0	55,2	62,9	347,6	53,3	2,5	1,9	599,4

Figure 1.1: Statistic on the usage of public transportation from 1997 to 2015 (Helsinki,June 2017).

However, most of the bus transportation services do not provide detail information of the buses nowadays as the bus transportation service provider only provide a bus schedule timetable to the passengers. Thus, a bus tracking system is developed to provide the real time bus location to the passengers. Besides, other information such as the route, status and estimated arrival time of the bus are able to display to the passengers by using the system.

A bus tracking system mainly consists of a phone application to display the information of the bus and a database to store and transmit the bus data. There are two types of bus tracking system which are SMS based bus tracking system and Android application based bus tracking system. Moreover, the bus tracking system has improved the quality and service of bus transportation service provider as the passengers are able to know the current location of the bus. This feature allows the passengers to schedule their time wisely because the estimated arrival time of the bus are shown in the bus tracking system. Hence, this will improve the number of bus passengers because services have been improved and public transport is cheaper. Therefore, the improvements of bus tracking system have to be made from time to time in order to provide a better service to the passenger and to reduce the car usage among the citizen.

1.2 Problem statement

Nowadays, most of the existing bus tracking systems does not provide many useful bus information to the user as the systems only provide the information that is related to its own specification. Thus, the user has to choose the bus tracking system accordingly based on their requirement. This may causes the user to feel annoy as they have to use different bus tracking system in order to know more information of the bus. Moreover, the existing bus system does not shows the exact amount of passenger onboard. This may cause the user to feel frustrated when they spent time to wait for the bus and are not able to get in because the bus is full. Hence, the problems have to be solved in order to improve the bus transportation services.

1.3 Objectives

The main objective of this project is to develop an Android based bus tracking system that shows the number of passenger on board to the user. Next, the second objective of the project is to develop a bus tracking system that show the useful information to the user such as the real time bus location, bus schedule and the number of available bus.

1.4 Scope of project

This project will mainly focus on designing the bus tracking system that display the number of passenger onboard and the real time bus location to the user by using an Android application. Moreover, a simple Android application and database will be made to display the information to the user. On the other hand, the cost of implementation of the project will not be consider.

1.5 Project requirement

Table 1.1: Project requirement.

GPS tracking system
Object detector system
Wi-Fi enabled system
Wi-Fi enabled Android smartphone
Database server
Microcontroller

This project requires the use of a GPS tracking system, object detector system, Wi-Fi enabled system, Wi-Fi enabled Android smartphone, database server and microcontroller in order to build the proposed bus tracking system. The GPS tracking

system is used for tracking the real time position of the bus while the object detector system is used to detect how many passengers are onboard. Next, the microcontroller is used to control the GPS tracking system, object detector system and Wi-Fi enabled system where Wi-Fi enabled system is used to connect the device to the database via Internet. Lastly, the database server is use to collect the bus information and send it to the Wi-Fi enabled Android smartphone that are requesting the bus information on the Android application.

1.6 Summary

A bus tracking system can used to provide the bus information to the passengers such as the current location and estimated arrival time of the bus. There are two types of bus tracking system which are Android based and SMS based bus tracking system. However, the existing bus tracking system has its' own disadvantages as it does not provide many useful information to the user such as number of passenger onboard. Thus, one of the objective of this project is to implement a bus tracking system to provide the number of passenger onboard to the user. Besides, this project will mainly focus on building a bus tracking system that provide real time bus location and number of passenger onboard to the user. On the other hand, this project require the use of a GPS tracking system, object detector system, Wi-Fi enabled system, Wi-Fi enabled Android smartphone, database server and microcontroller in order to build the proposed bus tracking system. In conclusion, this project is relevant to be implement.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter will discuss about the overview and the development of different type of bus tracking system. Moreover, the software and hardware components requirements are covered in this chapter. Besides, the comparison between existing bus tracking system, type of software and hardware components that are being used are also discussed.

2.1 Introduction to bus tracking system

Bus tracking system is a system that provides information on the real-time position of a bus to the customer or public transport operator. Moreover, a bus tracking system also has the ability to provide other information such as estimate arrival time, route, and schedule of a bus. Furthermore, the information provided by the system can be viewed from various platforms such as phone application, web page or display system installed at the bus stop. It can be used on bus transportation service to attract customer or used on school bus to improve kid's safety. Figure 2 shows the basic architecture of a school bus tracking system. It consists of GPS, GPRS, database and dashboard where GPS is used for obtaining the location of the bus, GPRS for sending obtained information to the database via cell phone network, database for storing the data and a dashboard that allows the user to retrieve information from database.