IoT Bus Tracking System

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ABSTRACT – The problem of getting buses is often a nuisance to bus users. It is related to the question of when will the bus time will arrive, how long does it takes to wait or more important is to determine if there is any bus going to a station. This Internet of Things (IoT) Bus Tracking System is a proposed solution that introduced a mobile system that can detect the bus coordinate location. IoT Bus Tracking System is an android-based system that requires users to have the application on their Android devices; where the driver send their coordinate location to the server, and diverted to user's terminal. Iot Bus Tracking System is a Google Map assisted application, which displays the dynamic coordinate location of the bus on the user screen.

1. INTRODUCTION

The bus service is a kind of ancient public transport that is still practical to the current environment. It shows the bus usually moves in its route to the final destination and returns to the station where it starts moving. Along the route, there are stop stations that allow the user to use the bus to their destination which is located along the route of each bus. Always happen, the bus takes too long times to reach each stations, and make users bored on with too long waiting time. Sometimes it involves until more than an hour of waiting, but the bus still does not arrive. Therefore, the project is proposed in order to help the bus user. The aim of this project is to make an android application helper that able to track the location of the bus using Google Map. It could estimate bus arrival time, the bus live locations and the movements of the bus using their android application.

2. DATA COLLECTION AND ANALYSIS

Data collection and analysis is done on the existing bus tracking system in Malaysia and foreign country. In Malaysia, it is used in Universiti Tun Hussein Onn (UTHM) and Universiti Malaya [1]. UM Bus Tracking System is an android based system, while UTHM Public Shuttle Tracking System is a website based system. Both system could show the bus real time location, but UM system add more features with the ability for user to set alarm to acknowledge when the bus arrived at the destination.

For the cases of other countries, the analysis is done on the implementation in Rice University [2] and Northern Illinois University (NIU) [3]. Rice University bus tracking system is available in website, android, and iOS application. The website is very intuitive for the user as the user can select the bus routes and track the bus they desire. It also shown the bus estimated time of arrival. However, the android and iOS application cannot track the bus inside the campus, as it can only detect the bus when it operates outside. Therefore the application is not fully effective for the students. The NIU use website based bus tracking system. This web is function similar with RICE University, but it has his own feature which allows the user to know the attraction places around the bus stop.

From that, it is understandable that the proposed IoT Bus Tracking System must include the ability to locate the bus location in real time and shows the information in the nowadays location application; which is Google map. Finally, the Android platform is a must, in order to follows the latest trend in delivering networking system.

3. METHODOLOGY

This project implemented with waterfall model. This methodology is the most suitable as it designs to produce a quality product in a short amount of time. Besides that, the waterfall model can provide some output from each phases of the project [4]. There are six phase in waterfall model shown in Figure 1.

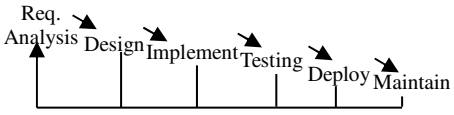

Figure 1: Phases in Waterfall Model (Sommerville 2004)

IoT Bus Tracking System have two interfaces that belongs to the user and the bus driver, both are connected to the server. How it works? The bus driver should activate their application while driving the bus, so that the bus locations could be sent to the server. When the user activate their application, they will get the real time locations of the bus displayed on the Google Map interface that embedded in the system. The application will produce a 'Beep' sound when the bus come near to the user. Figure 2 shows the operation of the IoT Bus Tracking System, while Figure 3 shows the sample of interface.

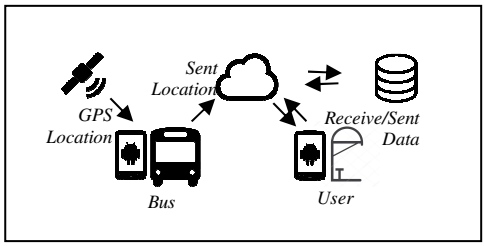

Figure 2: Operation of IoT Bus TrackingSystem

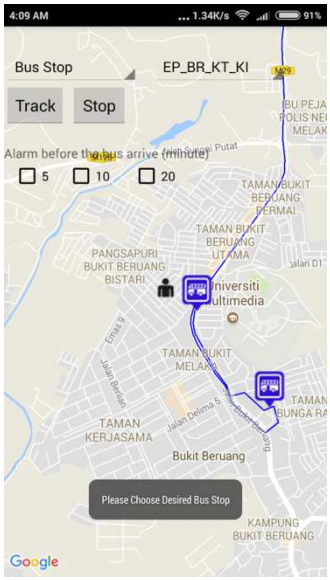

Figure 3: The Interfaces

4. PROJECT LIMITATION

This project however have three limitations; 1. The Internet Connection, 2. Limited Android only, and 3. Design limitations. This application is very dependent on Internet connection, it means if the Internet is not in good condition it will affect this application performance. Then, because it is an Android application, this IoT Bus Tracking System only available on Android hardware only. Furthermore, due to the slow internet connection, it will affect design features shown in the interface.

5. TESTING

IoT Bus Tracking System is tested to 10 user from random background. The locations is at University Technical Malaysia Melaka, and it first done by installing the application into the phone of each respondent. The respondent then given a basic explanation on how to use the application while getting a bus service. Respondents then asked to complete a questionnaires with 6 questions that aiming at:

i. The application user friendly level (Description 1).
ii. The ability of 'Google Map' in the application to displays the location of the bus (Description 2).
iii. The accuracy of the bus arrival time (Description 3).
iv. The effectiveness of the 'alarm' to indicates the bus upon arriving (Description 4).
v. The ability to display the bus schedule (Description 5).

60% of the respondent agree that the interface for this application is perfectly acceptable and satisfy with the ability of 'Google Map' in the application to displays the location of the bus. 50% of them acknowledges the accuracy of the bus arrival time, while 60% of them love the alarm function and the bus scheduled display features. Overall, the participants are firmly happy with the ability of IoT Bus Tracking System. From the Table 1 below, it can be seen that most of the participants are satisfy with the system, and couldn't agree more about the system will help user so much.

Table 1: Testing

User Acceptance Testing					
Description	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	0	1	3	5	1
2	0	0	4	4	2
3	0	2	3	5	0
4	1	1	2	5	1
5	0	2	2	6	0

6. CONCLUSION

Based on the testing result, it can be concluded that the IoT Bus Tracking System has fulfilled the needs of user at the tested locations. It is well said that the application can help the user to track the buses and benefits user very much.

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