

GPS Supported City Bus Tracking System

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Abstract-Primary information for the most city transport travellers the bus arrival time. Excessively there often discourages the travellers due to long waiting time at bus stops and for taking buses makes them reluctant. In this system, based on bus passengers' participatory sensing we are going to present a system which will predict the time of bus arrival. With commodity mobile phones, for estimating the routes of bus traveling and to prediction of arrival time of bus at different bus stops, the passengers of bus are effectively collected and also utilized context of surrounding environmental. On the participating users collaborative effort there solely relies the and it is not dependent from the operating companies of bus, so without support requesting from particular bus operating companies for supporting the universal bus service systems it can be adopted easily. We resort to energy efficient sensing and more generally available resources, including signals of cell tower, statuses of movement, recordings of audio, etc., instead of referring to GPS enabled information of location, to the participatory party and bring less burden by encouraging their participation.

Index Terms-Time prediction; Participatory sensing; Mobile phones; Global positioning system.

1. INTRODUCTION

There are buses made available for passengers travelling distances, but not many passengers have complete information about these buses. Complete information namely the number of buses that go to the required destination, bus numbers, bus timings, the routes through which the bus would pass, time taken for the bus to reach, maps that would guide the passenger with his/her route and most importantly, track the current location of the bus and give the correct time for the bus to reach its bus stop.

The proposed system deals with overcoming the problems stated above. The system is an Android application that gives necessary information about all the buses travelling in Pune. This information overcomes the problems faced in the previously built application "Pune Bus Guide". The platform chosen for this kind of system is Android, reason being Android Operating System has come up on a very large scale and is owned by almost every second person. Also, Android is a user friendly platform, thereby enabling ease of access for all the users.

A number of applications made for the Android Operating System is increasing on a large scale ever since its advent. Android is an open source mobile software environment. Brought up by Google, the operating system has been made Linux based and uses Java programming language. It has a virtual machine that is used to optimize memory usage as well as resources.

This application has been developed using IDE(Eclipse

Integrated Development Environment) with ADT (Android Development Tools) and Android SDK(Software Development Kit).[3]

There are a number of constraints that need to be satisfied. A few of them may be stated as follows:

1. The users phone should be GPS connected.
2. The phone should not lag each time any route or bus number has been requested for.
3. The platform used must be Android only.
4. All the bus numbers must be stored in the database and retrieved whenever asked for.
5. The bus timings must match the real time bus arrival.
6. The bus locator must give the exact location details about the bus.
7. The time given for the bus to reach the bus stop much be almost accurate, irrespective of the traffic obtained.
8. The application must have information about all the routes in Pune.
9. The application must be user friendly enough for the user to understand it and operate it.
10. The application must be updated with the addition of new buses along with the bus numbers as well as the bus timings and new routes.
11. The location tracker must track the location of the passenger as well as the bus to give the estimated time, and then guide the passenger with the route to his/her destination.

12. The application must not need internet while displaying only the routes. It must be done in offline mode.

13. The Android versions must support the application.

A large number of applications were developed for this kind of purpose, but none of them worked due to inaccurate or incomplete information.

The main goal of the proposed work is to improve the Bus system by adding the necessary additional features into the application, like accurate bus timings, correct bus numbers and moreover adding a GPS tracker into it. This study accepts input in the form of selection of the source and destination and selection of the bus travelling the distance to display the entire details about the routes and also track the location of the respective bus and give the map for the same.

The rest of the paper has been organized as: section 2 indicates motivation, section 3 highlights the related work along with their downsides, section 4 discusses the proposed system modules, section 5 gives the development algorithm of the system. Section 6 shows the mathematical model of the system, section 7 displayed applications, section 8 shows result followed by conclusion, future scope as well as references.

2. MOTIVATION

1. Passenger have to wait for the bus to arrive, hence to reduce the waiting time we are developing this system.

2. The main focus is to reduce the waiting time as well provide the location of bus.

3. Also provide details to the passenger about seat availability in the bus. This was one of the main motivation behind developing this system. Such systems must be installed urgently in order to reduce the number of abduction taking place.

3. RELATED WORK

1. One application that was implemented in Mumbai, named "M-Indicator – Mumbai" has drawbacks like: It displays matter which is the same as what is online. Its latest updates have given issues on every Android mobile supporting even the most recent device version. The "A to B" module of buses has given problems. Whenever an option for the source to

destination is selected, the field still remains blank, i.e. no bus routes are displayed [6].

2. The application built in Delhi named "Delhi Bus Navigator" has drawbacks like: The application works smoothly when offline, but works very badly when connected to the Internet. The application gives information about direct routes only. It does not give information about the alternate routes. This application has bugs due to which it lags all the time. Most of the time the application crashes when requested for specific bus routes [7].

3. The application developed in Bengaluru named "Bangalore BMTC Info" has drawbacks like: The application is never in an updated condition. The application has fed in wrong routes on several buses and given no updates to fix them. After the minimization and restoration of the application, it cannot search anything. This application crashes almost always. The application is not user friendly with a complicated User Interface (UI) [8].

4. The application developed in Chennai named "Chennai Bus Route" has the following drawbacks: The application works fine, but the bus timings have not been mentioned. Not all bus stops are updated. The application does not display maps [9].

5. The application built in Ahmedabad named "Ahmedabad BRTS" has the following drawbacks: This application has not been updated since the time of its development. Number of buses and routes are still the same. No changes made to them [10].

These examples clearly state that all the bus applications implemented so far have faced serious problems, which have still not been fixed.

Currently, there is no framework application built in Pune to track the location of the bus. Most of the earlier tools were developed considering only a few constraints. This led to exclusion of many important constraints which further caused problems while operating the application. This system deals with overcoming all the problems faced the earlier applications and providing a bug-free, user friendly application. The significance of our method is to

resolve each of these above cited problems. The system takes basic information about the source and destination, selection of the bus, and displays the bus numbers along all the routes heading to the destination, generates maps as soon as the bus number is selected and most importantly tracks the location of the bus with the help of GPS and sends the location and the minimum time required for the bus (irrespective of the traffic) to arrive the bus stop.

4. MODULE

The proposed system has been divided into two modules as follows. Module 1 gives information about all the routes from the source to the destination and give maps for the same. Module 2 give information about all the buses along with the bus numbers that go through the selected stops, track the location of the selected bus and send this information to the passenger giving him/her the estimate time required for the bus to reach. This is done using the Client-Server technology

4.1 Module 1 (Routes and Maps)

The first module depicts the process of selection of routes from source to destination and presents the respective map for the same. Every direct and indirect route would have a map for itself.

4.2 Module 2 (Stops and Location Tracker)

The second module depicts the process of selection of the stops till where the passenger wants to travel. Passengers wanting to select stops can do so, irrespective of the routes. The Location Tracker will detect the current location of the bus and send the location back to the passengers device. The Client-Server technology is used in this kind of system.

5. ALGORITHM

Map matching algorithm:

Step 1: start
IF $\text{DistFN}(i) < 20$ m then
Go to step 2
Else
Go to step 3
Step 2: P(i) is matched to nearest Node
Set C(i) = True
Go to step 5
Step 3: IF $\text{DistFL2}(i) / \text{DistFL1}(i) > 2$ then
Go to step 4

Else
j=i-1;
Go to step 7
Step 4: P(i) is matched with nearest link
Step 5: i=i+1;
Step 6: IF Exist(i) then
Go to step 1.
Else
Go to step 15
Step 7:
IF exist(j) then
Go to step 12
Else
Go to step 4
Step 8: IF C(j) == true then
prev=P(j)
K=i+1;
Go step 9
Else
j=j-1;
go step 7
Step 9: If Exist(k) then
Go to step 12
Step 10: If C(k) == true then
Next=P(k);
R1=Routing [prev ~p'(i)]+Routing[p'(i)~Next]
R2=Routing [prev ~p'(i)]+Routing[p'(i)~Next]
Go to step 11
Else
K=k+1;
Go to step 9
Step 11: IF R1 < R2 then
Go to step 12
Else
Go to step 13
Step 12: P(i) is matched to nearest link
Step 13: P(i) matched to secondly nearest link
Step 14: c=false
Go to step 5
Step 15: END

Abbreviations:

P(i): ith GPS point
P'(i): ith GPS point which is map matched to NL temporarily
P''(i): ith GPS point which is map matched to 2NL temporarily
C(i): guarantee index, P(i) can be used to find the shortest path if C(i)=TRUE

Prev: previous GPS point which is used to find the shortest path

Next: next GPS point which is used to find the shortest path

DistFN(i): distance to the nearest node from P(i)

DistFL1(i): distance to the NL from P(i)

DistFL2(i): distance to the 2NL from P(i)

IsExist(i): function which returns FALSE if ith GPS point does not exist

Routing[P(i)~P(j)]: function which returns the distance of the shortest path between P(i) and P(j)

7.2 Limitations

1. To get information user needs to have android phone.
2. Internet connection is necessary.
3. The system can be used in traveling organization such as olla, blabla, taxi, radio cab etc.

6. MATHEMATICAL MODEL

System Description:

Input: Passenger login to the system and send bus id to be search location.

Output: Bus time predicted.

Identify data structures: classes, divide and conquer strategies to exploit distributed/parallel/concurrent processing, constraints.

Our system work as a distribute manner. It means that one module is dependent on the another module. The output of previous module is required as a input to the next module. So that before executing previous module we cannot execute the next module.

Success Conditions: Our system will give the bus details and predicted time.

Failure Conditions: Without android phone we cannot run this application.

7. APPLICATIONS

1. The proposed system useful for government bus transport.
2. System can be used for private transport Business

7.1 Advantages

1. Save time of Passenger's to wait for bus.
2. Give appropriate information of Bus location and predicted time to reach.
3. Reduce conductor's headache of reporting to the depot.
4. Reduces paper work.

8. SCREENSHOTS

Smart Bus

Travel with smart bus

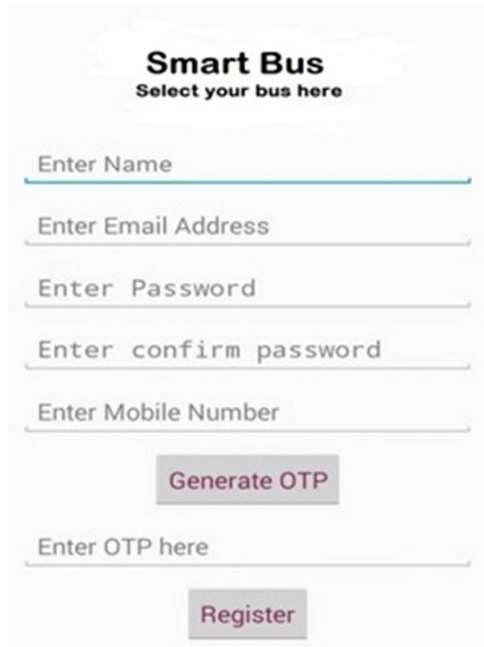
User Login Conductor Login

login

New here? Sign up

192.168.43.105

Fig. 2. Login Form



The image shows a registration form titled "Smart Bus" with the subtitle "Select your bus here". The form contains several input fields: "Enter Name", "Enter Email Address", "Enter Password", "Enter confirm password", "Enter Mobile Number", and "Enter OTP here". There are two buttons: "Generate OTP" and "Register".

Fig. 3. Registration Form



The image shows a "Bus Registration" form. It has four input fields: "ID:" with the value "105", "Source:" with the value "Pune", "Destination:" with the value "Narayangaon", and "Source Time:" with the value "10.30". There is a red "ADD" button at the bottom.

Fig. 4. Bus Registration

9. CONCLUSION AND FUTURE SCOPE

The conclusions of this study suggest that knowledge of specific domain improves the results. This Project has been implemented on Android platform. Also, different attributes have been added to the project which will prove to be advantageous to the system. The requirements and specifications have been listed above. This project is implemented using Android and

the SQL domain. Using the GPS system, the application will automatically display the maps and routes to the different locations and also track the bus location using client-server technology and forward it to the client device.

This project will be put up on the cloud platform, so that it will be accessible by every Android user. The application will prove beneficial for every bus traveler, or even tourists. Not just buses, but this application will be useful for every person travelling by any means of transport. The Location Tracker will give the exact location of the bus which will make it easy for the passengers to travels.

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