Bus Tracking and Bus Failure Detection System Using GPS

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Abstract -

People use public transportation in many countries as a means of transport for travelling and accordingly people would favor this public transportation to be scheduled on time and the frequency to be increased for commuters to make good use of it. Sometimes they face the difficulties when the bus fails during ongoing journey. To get the necessary help from verified sources is really difficult and lengthy. Passengers in the bus have no idea when the actual help is going to arrive or not. So we are going to implement a system in which; in case of a bus failure, the help should be sent as soon as possible. This system will drastically reduce the waiting time of the passengers. Also bus depot manager gets real time location update of each bus. In case of bus failure, a message can be sent to each bus of that area for help. Transport Corporation as case study has been proposed which enables commuters towards tracking the bus of their choice and also knowing their estimated arrival times. Proposed system has been validated using Android in this research this system is not only reasonable but also applicable in real life and can enhance the current bus system in way which will ease their management by serving as an intelligent bus tracking system. The bus passengers are benefited as they can find out the list of buses they can board for their travel and also check the current location status of their point of interest bus with details.

Key Words: GPS, Android, bus positioning, location tracking, real-time.

1. Introduction

In the daily operation of public transport systems, when passengers travel by the bus, sometimes they face the difficulties when the bus fails during ongoing journey. The bus driver and the conductor try on their own to find out the solution to the bus failure. To get the necessary help from verified sources is really difficult and lengthy. During this hectic process all passengers don't have any other option but to wait. But passengers in the bus have no idea when the actual help is going to arrive or not. They go into dilemma whether to wait there for help to arrive or to move by private vehicle. This is really time consuming process as well as annoying for passengers.

In this proposed system we are building an android application which will be used by public transport authorities. By using this application emergency help can be provided to the failed buses during ongoing journey. Our system uses GPS (Global Positioning System) to track the movement of each bus. If any of the buses fails then a message is sent to all the near-by buses and bus depot manager. So help will be provided as soon as possible to the passengers. Hence time of the passengers is saved and inconvenience is reduced to the minimum.

In the daily operation of public transport systems, mainly that of buses, the movement of vehicles unlike vague conditions as the day advances, such as heavy traffic, non expected delays, randomness in passenger demand, irregular vehicle-dispatching times, and incidents. Many employees are often late to work; students are late for schools and colleges because they decide to wait for the bus instead of just simply using a private vehicle. To make this system more user friendly; We propose an android application that will be accessed through android smartphones. Real time vehicle tracking for better transport management has become possible with the invention of GPS and the cellular network. We can mount these technologies in public transport systems, especially buses, which are unable to adhere to predefined timetables due to reasons like traffic jams, breakdowns etc. Passengers don't find public transport system attractive because of increased waiting time and uncertainty about the bus arrival. As mentioned above our application uses GPS to track location of buses in real time. To spend the time of passengers efficiently and to catch the required bus on time or whether to take alternate means of transport if the bus is delayed. So the journey of the passenger/user can be planned long before they take on it. Our application will develop friendly relationship between passenger and public transport system. This will indirectly conclude more use of public transport system and therefore will reduce traffic and pollution.

1.1 Problem Statement

The proposed system will help to detect the position of a bus, so in case of a failure of a bus, the help could be provided in minimum time And This proposed system will also provide you with the end-user required to view the schedule, route and track the current GPS location of the bus in real time through a user-friendly App (Android App) which is simple, clear and has good graphical interface.

2. Architecture and modeling

Working

Android Modules: In the Authentication process Driver can login into app by clicking Login button. After login he can able to start journey.

In the Dashboard Module After login driver can start journey by clicking START JOURNEY , before starting of actual journey he has to fill details for eg:

Bus Number (e.g. MH-15 bc 2061)

Bus Rout Number (e.g. 65)

Starting bus Stop (e.g. CBS)

Destination bus Stop (e.g. NK Road)

It will continuously update status of bus to server (After every 1 min).

After start journey he can able to do following things

If any problem occurred he can inform to Head Stop (INFORM HEAD OFFICE).

Also his information get notify to other Bus drivers on that route (NOTIFY OTHERS).

He can stop journey by clicking STOP JOURNEY or COMPLETED JOURNEY.

Public User Modules:-In the public user module a person or user who have android platform can easily track the buses by user friendly android application he login in the app and can track the bus schedule, routes, timetables etc

Server Modules

Authentication Module:

Admin can login to server by providing his credentials.

Head Stop officer can login into server by providing credentials

Dashboard Module:

After Login, ADMIN will be able to do following things

- Can add officers for HEAD BUS DEPOT.
- Can check list of officers.
- Can check list of buses related to depot.
- Can check list drivers.
- Can check list of conductors.
- Can check bus status (Location or running status [up or down]).
- Can check route of bus.

After login, HEAD BUS DEPO OFFICER will be able to do following things

- Can add bus drivers.
- Can add bus.
- Can add conductors also.

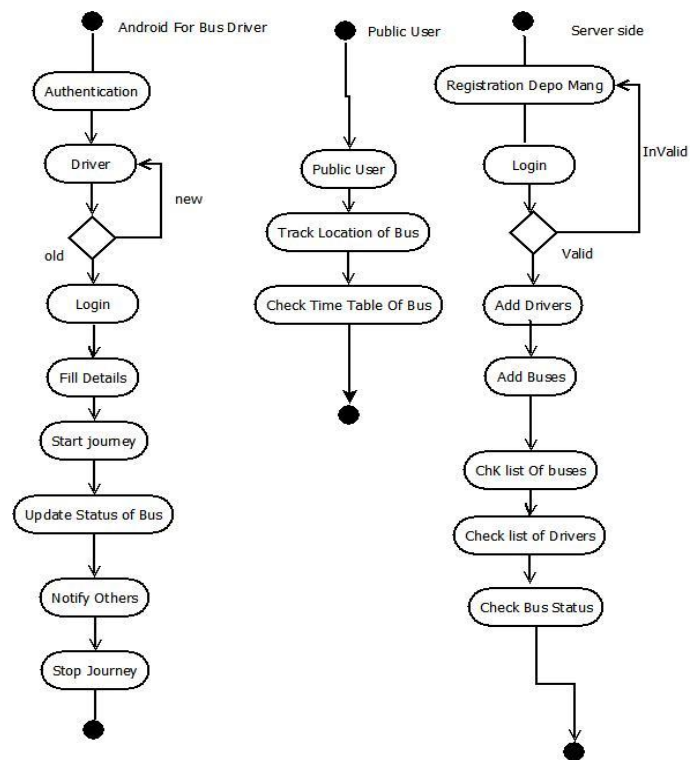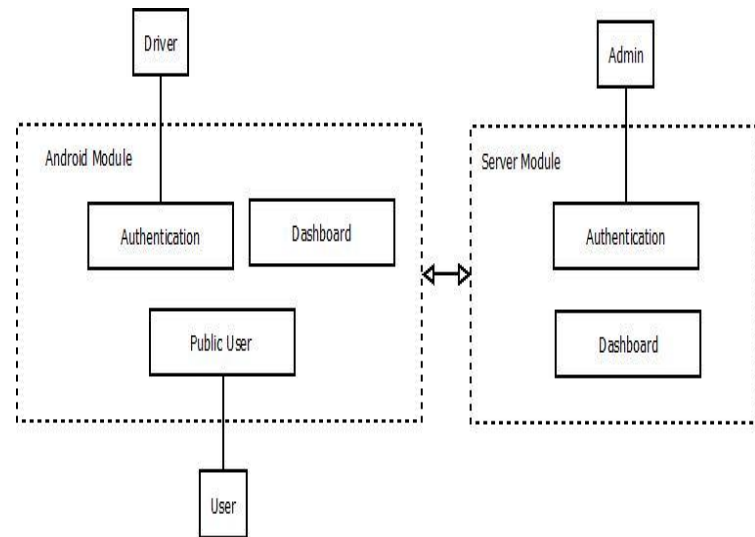**Fig -1**: System Architecture.

Fig-2: Activity Diagram.

2.1 Mathematical Model

System S= {BusTrackingSystemApplication}
System S= {S1, I, d, O}
S1 = {GPS, Google Maps}
I = {V, SD}
d = function
O = output
I1 = V =>> Variables
I2 = SD =>>Source & Destination Array
[1]   I1 = {Area, Emergency Type}
D1 = I1 =>> O1
O1 = {ST1,ST2,ST3, ...,STn}
ST = Bus Stop
[2]   I2 = {Source; Destination}
D2 = Cal
Cal = {Source; Destination}
R = {R1, R2, R3, ... ,Rn}
R1 = {Source, node1, node2, ... ,node n}
Source = Distance [Source] + nodes
S= DistanceBetween [Source, node i]
i= 1
D = {D1, D2, D3, ...,Dn}
[R = Routes, D = Distance]
Min. Time = Min (D1, D2, D3, ..., Dn)
O2 = {Min. Time}
Show (Min. Time)

2.2 Algorithm

Google's Encoded Polyline Algorithm

Google has developed an Encoded Polyline algorithm for highlighting the trail connecting two points. On Google Map, to show path, we have to use Encoded Polyline algorithm. To show the whole path we need all intermediate points between source and destination point. So for calculating the different intermediate points we need the Encoded Polyline algorithm. An encoded polyline is a set of coordinate pairs which have been changed to an ASCII string to considerably decrease the overall size of the data. Encoded polylines are used to store big combination of coordinate data to project a line or shape on a google map. The encoded polylines are made from sets of coordinate pairs and are provided through an algorithm. The algorithm takes the disparity between two coordinate pairs, multiply it with 1e5 and then the rounded values are changed into binary values, after that the algorithm translated that binary value to ASCII characters. Every ASCII character has eight bits of data, hence the savings adds up and the entire ASCII string given by the algorithm at the end is the details of various points of route.

3. Future scope

Time is really precious these days. Everything we use on a daily basis has been simplified by a technology, so that we can save our time and do our work in more efficient way. For ex. Invention of a TV remote; in earlier days we used to operate TV by the controls attached to it. Now, with the help of a remote we can save the time and operate the TV from a distance.
Public Transport System lags in using the technology. We want them to use our application that will ease their work and will take public transport system to the next level in the future. With everybody buying four wheelers so casually, future of public transport system is in danger. They have to take prior steps to save themselves and our application will surely be an advancement..

3.1 Advantages

Mobile application: The proposed system is working on android platform. It is a user friendly android application. Android is popular platform which has 1.6 million applications and still counting. It is very easy and convenient to use in mobile.
 User can know exact location of bus: By using proposed android application, user can track the buses. He does not need to wait long hours on the bus stop as he can track the bus info in which he is interested and able to make decision.
Driver can get help as soon as possible: In the existing system there is no provision of getting emergency help In case of bus failure that's why passenger face inconvenience but by using proposed app, driver can send message to nearer bus driver and depot manager to get help as fast as possible.
Depot manager can track of each bus.: In the proposed system the depot manger can track each bus related to depot. He can send the message to bus driver for help in case of bus failure.

3. CONCLUSIONS

In case of bus failure, passenger will get help as soon as possible without waiting for hours and they can easily move to their destination without the delay. With this system, user can come to know exact location of bus and therefore user can take right decision and save their valuable time.

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