International Journal of Education and Science Research Review
E-ISSN 2348-6457
Volume-3, Issue-2
April- 2016
www.ijesrr.org
Email- editor@ijesrr.org

Intelligent Real Time Bus Tracking System

Mansi Lamba, Poornima Kapoor, Shivam Sharma
Department of Information Technology
SRM University, NCR Campus, Ghaziabad

Mr. Manoj Kumar Srivastava
Assistant Professor
Department of Information Technology
SRM University, NCR Campus, Ghaziabad

ABSTRACT:
The paper proposes a Real Time Bus Tracking System using GPS Technology, Navigational API & Google API to provide cost effective solution for users. An efficient tracking system is designed and implemented for continually monitoring bus location. Users will be able to screen a moving bus on demand using a Smartphone Application and determine estimated distance and time for the bus to arrive at a given destination. Our Smartphone Application will also allow a user to access bus location form a database and monitor it on Google Maps in real time. In order to show the feasibility and effectiveness of the system, this paper presents experimental results of the bus tracking system.

KEYWORDS: Bus Tracking System, Smartphone Application, GPS, Navigational API, Google API, Android

INTRODUCTION

The world is experiencing accelerated growth in smartphone ownership. As smartphones find use in our day-to-day lives and become more familiar to people, their influence on society continues to grow. The main force for this accelerated growth in smartphone usage is the availability of a large number of applications to meet the needs of range of users.

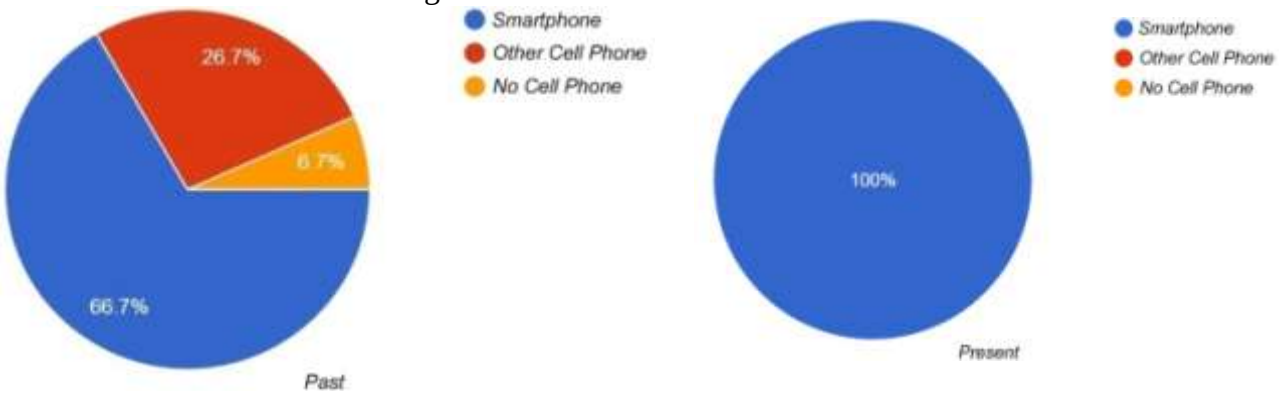

Fig. 1 Smartphone users increased 33.3% over past t

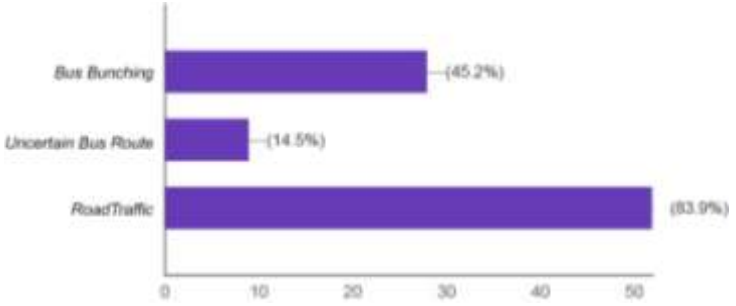

Fig. 2 Survey Summary Chart

Public bus passengers that use a smartphone for every need, on the contrary, are often late to work because of mismanagement and insufficient knowledge of buses passing through their choice of routes. As a part of our project we surveyed a class of students about their opinions on the current public transportation service. Following conclusions were obtained:

1. 45.2% agreed that they had been late to their destination due to bus bunching.
2. 14.5% affirmed that real-time bus location on destined routes would be beneficial in deciding which bus to choose.
3. 83.9% were however late because of road traffic.
4. 98.4% supported the idea that a smartphone application for tracking public bus transport would be useful.

Our smartphone application offers convenience to the users and makes it handy to track buses in real-time. The tracking system proposed in this paper has the following features:

1. Acquisition of geographic coordinates and unique identification data in real-time using GPS
2. Transmission of location, identification data, seat availability information, etc. to a web server
3. Database stores and manages received information
4. Whenever a user requests information it can be accessed from the database and real-time location can be monitored on Google Maps

The interface algorithm of our smartphone application is self sufficient and continuously analyses location information. It verifies bus status and checks for regular schedule follow up. Thus, the proposed system should be able to enhance efficiency of public transportation system.

LITERATURE SURVEY:

Intelligent Bus Monitoring and Management System, M. A. HANNAN, A. M MUSTAPHA, A. HUSSAIN and H. BASRI

This paper deals with the implementation of an intelligent bus monitoring system based on current challenges and problems. In this system, radio frequency identification (RFID) and integrated sensing technologies such as global positioning system (GPS), general packet radio service (GPRS) and geographic information system (GIS) are used to monitor the movement of a bus. Results show that choice of integrated technologies used in the system is suitable to monitor and manage a transportation system.

Observations: RFID tags are unreliable since prolonged exposure to heat, unfit weather conditions and electromagnetic exposure may affect their working. They may even be read by unauthorized sources. RFID tags are costly and large in size, thus we restricted the use of RFID tags in our project.

Tracking Vehicles with GPS, Jianyang Zheng, Yinhai Wang and Nancy L. Nihan

This paper investigates the feasibility of tracking vehicles with regular GPS devices.

Observations: Global Positioning Systems (GPS) is widely used in tracking vehicles and is superior to conventional technologies. This technology is reliably useful. However its accuracy may sometimes be compromised due to any obstruction in signal reception.

Understanding Mobility Based on GPS Data, Yu Zheng, Quannan Li, Yukun Chen, Xing Xie and Wei-Ying Ma

The paper proposes an approach based on supervised learning to infer people's motion modes from their GPS logs. It identifies a set of sophisticated features, which are more robust to traffic condition than those other researchers ever used. It proposes a graph-based post-processing algorithm to further improve the inference performance.

Observations: It is difficult to collect sensor data and also to maintain identical precision at such a large scale.

EXISTING PROBLEMS & PROPOSED SOLUTION:

A. **EXISTING PROBLEMS IN PUBLIC TRANSPORTATION SYSTEM:**

1. Safety in Buses- It is particularly important to know the time of last bus home, if you are travelling late at night so that you do not become stranded and vulnerable to risk.

2. Bus Bunching- Some buses are overcrowded while others are unfilled due to abnormal bus frequency between source and destination station.
3. Bus Schedule- Passengers have no idea about bus timings.
4. Route Uncertainty- No control over the routes taken by drivers.
5. Seat Availability- Passengers are generally unaware of vacant seats in a bus.
6. Special Busses- During festivals government runs additional buses on different routes but passengers are generally unaware of such services.

B. **PROPOSED SOLUTION:**

With Intelligent Real Time Bus Tracking System passengers will get the following information:

1. Bus Schedule- Number of buses on a route, arrival and departure time, information of least next three buses on a particular stop, etc.
2. Seat Availability- Number of vacant seats in a bus.
3. Special Buses- Any new special buses on a particular route during festivals.
4. Bus Tracking- Tracking buses will bring a sense of responsibility among drivers as they will be constantly monitored.

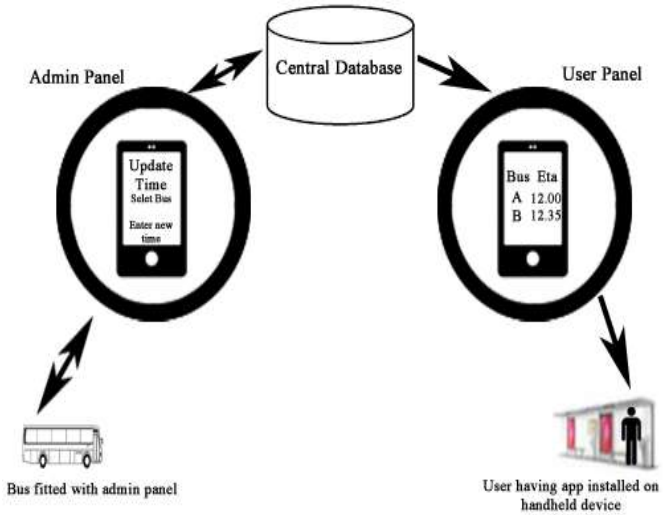

Fig. 3 Block Diagram of Proposed Solution

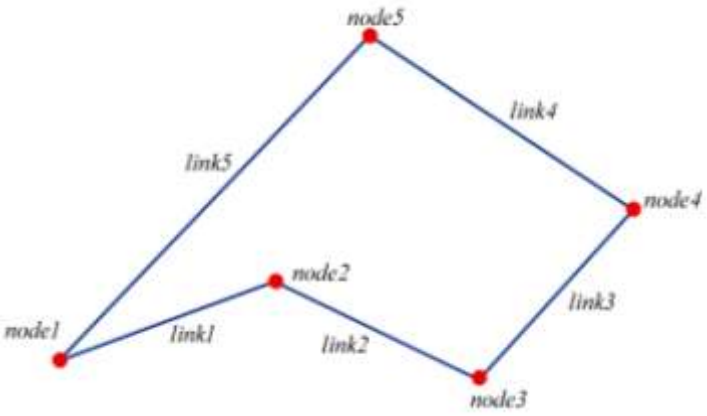

Fig.4

IMPLEMENTATION DESIGN:

CREATING A ROUTE MAP:

To draw a route map, with little human intervention in application and fill the database, we create a method as follows:

```
protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
                Intent i=getIntent();

            String source=i.getStringExtra("source");
            String destination=i.getStringExtra("destination");

String uri = "http://maps.google.com/maps?saddr=" + source+"&daddr="+destination;
Intent intent = new Intent(android.content.Intent.ACTION_VIEW, Uri.parse(uri));
intent.setComponent((new ComponentName("com.google.android.apps.maps",
            "com.google.android.maps.MapsActivity")));
                startActivity(intent);
        }
```

A bidirectional graph can be used to depict a route map. This graph will be used for calculating the estimated time of arrival (ETA). Routes will be shown as chain links connecting nodes or bus stops. A particular route can be identified by its unique identification number.
Fig.4 Creating a Route Map with Nodes & Links

PREDICTING ETA-ESTIMATED TIME OF ARRIVAL:
Arrival time prediction algorithms can be very simple, involving merely a bus schedule table or could be very complicated, involving artificial neural networks, space-time correlation, etc. Past bus location data can be used to predict arrival time.
ETA can be predicted by simply adding integral number of round trip times to the smallest ETA.

```
Protected void on Post Execute (Void result) {
                    super.onPostExecute(result);
          runOnUiThread(new Runnable() {
               public void run() {
                    Toast.makeText(getBaseContext(),  "Distance="+sDistance+"
value="+iDistance+" routes"+duration, Toast.LENGTH_LONG).show();
                    txtDetails.setText("Total Distance: "+sDistance+"\nETA: "+duration);
               }
```

WORKING APPLICATION FLOW CHART:

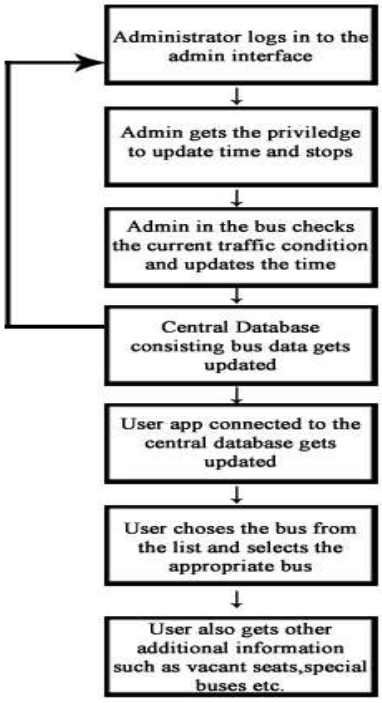

Fig.5 Flow Chart for Proposed Smartphone Application

RESULT:
We configured an android phone to demonstrate operating capabilities of our smartphone application. With access to administrator panel information such as bus source, bus destination, no. of stops, distance between two stops, bus route, etc. could be easily updated. A passenger on the other hand was able to get total distance, time of arrival, maps, difference in arrival time, and no. of available seats from our application.

FUTURE WORK:

This paper proposes the design and implementation of our smartphone application. The system helps passengers to get bus arrivals at a particular stop. It will fetch ETA of a requested route and provide real time information to passengers. It will make the public transport system competitive and passenger-friendly.

However a few other important services can be provided via our application. We can provide passengers' several utility services such as online ticket booking, virtual account for payment portals, feedback for bus services, raise a SOS signal if in danger, planned journey, etc.

ACKNOWLEDGMENT:

This research was partially supported by Mr. Manoj Kumar Srivastava & Mr. Dinesh Kumar Agarwal, Assistant Professor, SRM University. We are thankful for their insight and expertise that greatly assisted the research. We would also like to acknowledge an initial project work on Intelligent Real Time Bus Tracking System using Wireless Networks by SRM University undergraduate student, Kumar Shreyash and his co-authors. The prototype project was a proof of concept that significantly helped improve our manuscript.

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