BUS ON-ROUTE TRACKING SYSTEM

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Abstract

In this dynamic life, everybody is in an urgency to reach their destinations. In this case, waiting for the buses is not feasible. People who depend on the public transport system should know about the location of the bus for which they are looking for. With the advancement of technology, android smartphones have become universal and affordable for all. Smartphones have vast capabilities to provide rich user experiences with interactive facilities. Current position of the bus is acquired by integrating GPS device on the bus and coordinates of the bus are sent by either GPRS service provided by GSM networks or SMS or RFID. GPS device is enabled on the tracking device and this information is sent to centralized control unit or directly at the bus stops using RF receivers This Web based real time application enables the students to find out the exact location of the buses so that they will not get late or will not arrive at the bus stop too early. It provides the exact location of the student's respective buses which can be viewed on the google map. In addition, this application also gives the information like bus details, driver details, contact numbers, routes, etc. Therefore, the developed web application saves the student's time to wait for the buses as they can know their current location of the buses updated every moment in the form of latitude and longitude on Google maps

Keywords: **Live bus tracking, React JS, Node JS, MongoDB, GPS, React Leaflet.**

1. Introduction

Public Transportation is the major means of transport among the people. Growing density of population increases the vehicle density leading to heavy traffic and greater percentage of pollution. Optimal solution to this problem is preferring common modes of transport. Since common people are the greater ratio in making use of public transport, the necessity to provide them with ease of access stands at higher priority. This project mainly focuses on bus transport system. A recent survey by National Sample Survey Organization says that about 62-66% of people uses bus as their mode of transport. Public transport tracking system aims at providing the instant status of the bus to the users via an automated system. This project deals with Arduino which serves as the central controller acting like brain of the system. People on a long run wait for the buses at the bus stop.

Since they are unable to get the location of the bus, they get to take some other modes of transport to reach their destination. To destroy the manual log entry and to automate the process this project plays a vital role. Mobiles phones are chosen as the medium to communicate with the passengers that provides an easy access to them. In this paper the project focuses on tracking the buses, sending SMS to the authorized persons, updating the passengers through notifications and improving the accessibility to the system. The highlighted features of this project increase the interest of the passengers in taking public mode of transportation.

2. Literature Survey

The system is deployed using GPS, Web Application, Google Map and tracking device. It uses location tracking mechanism and it is updated for every 1 second to the cloud. Web application is used to monitor the exact location of the bus along with bus route and bus arrival time. Google Map will help in visualizing the location of the bus. The system, was developed using GPS, GSM, RFID and BTS (Bus Tracking System for location estimation). The proposed approach called Bus Tracking

System is evaluated using java simulation tool by considering both simulation and real time analysis. Both analysis results in improved accuracy and performance than the existing bus tracking system.

This project mainly focuses on accuracy of location and calculation of time, coordinates and simple user interface which saves time and increase the efficiency of work. The project can be done only if the bus is registered. There is a system, which is a web-based application. It uses GPS, GSM and Google map. GPS along with a SIM is used for tracking the bus. The location updating from GPS is send to the Web app through the central server. The web app has a timer which will be updated and refreshed for every 40sThere are various systems that use diverse data mining technologies to manipulate data to derive insights and help in decision making for farmers. The present data mining systems and algorithms used were focus either on one crop and predict or forecast any one parameter like either yield or price. A research presents a survey on the various algorithms used for crop yield prediction, study used to forecast the yield and price of major crops of Tamil Nadu based on historical data. The data and predicted output are accessible for the farmers through a web application. This aids farmer to decide on the crop they would like to plant for the forthcoming year. In addition, the web application also provides a forum for the farmers to goods the products without middlemen which help them to obtain maximum price for their products.

A system was developed using GPS, Google Map, SMS services, web server and Database server. By this application, the students can get live location updating when internet connection either available or not available. The time could not be predicted which is the main drawback in this project. The paper uses GPS, LoRa WAN and IOT. LoRa WAN means Long Range WAN and it is country specific. LoRa WAN is a long-range communication by using lower RF frequency which operates in unlicensed radio spectrum

A. RFID Tracking System for Vehicles (RTSV):

The RFID tracking system for vehicles aims at tracking vehicles using RFID and using this track log to analyse and reduce traffic congestion along various routes of cities. The system consists of a central database to store owner-vehicle information, track log of vehicles and stores basic demographic/ contact information related to system users. It has acentral processing system (server) that runs the algorithms on the track logs of vehicles and decideson the time intervals for the traffic signals. It also stores information about the toll collected/ to be collected from the owner's account. RFID tags are affixed to vehicle windscreens and can store information and send it to the RFID reader that receives information from RFID readers and sends the information in the form of messages to theserver.

(i) Client Module: Clients access client module of the system through a web browser. Clients that are likely to use the system are individual vehicle owner, insurance agencies, vehicle rental agencies, public transport companies and police / traffic authorities.

The system provides clients the ability to:

- Track the location of their vehicles (can be used by the traffic controllers also to booktraffic offences and check license updates)
- Get updates about current traffic situation
- Toll/tax/fines collected for their vehicles
- Retrieve the quickest (not necessarily shortest)route from one location to another and
- View insurance policy and registration information of their vehicles.

(ii) System User Module: The system users access this module using a web browser.

The system administrator is responsible for:

- Managing System User Accounts: includes registering system users and assigning permissions for the tasks they

are responsible for.

- Managing Client Accounts: includes registering clients and authorizing list ofservices to be provided to each client.
- Billing: Generating bills periodically for each client for accounting purposes.
- Client Relationship: Taking feedbacks and improvising on processes in future.
- Providing Services and Regulation: Checking services provided are delivered properly to clients.

(iii) Traffic Management Module: The Traffic Management Module calculates the traffic quotient. The traffic quotient can be used by the system to determine the shortest route between locations and to determine the timing intervals for the traffic signals so as to reduce congestion.

The Traffic Management Module is designed tocalculate the traffic quotient that will enable the system to determine the quickest route from one location to another as well as to determine the timing intervals for the traffic signals so as to reduce congestion.

The Traffic Management Module (TMM) will store:

- Various links (roads) between two RFID readers,
- Length and Width of the respective roads (or between two RFID reader junctions) and
- The speed limit for the vehicles on therespective roads.

The dimensions of the roads such as length and breadth can be obtained from the concerned road transport authority, for example Mumbai Metropolitan Region Development Authority (MMRDA, Mumbai, India).

Firstly, the system takes into account the fact that the vehicles are of varied dimensions. TMM calculates average area, projected on horizontal plane, occupied by the vehicles on a particular roadusing heuristics of the past data of the vehicles on that road.

Secondly, the road map of all RFID readers installed is stored in the database in the system to enable the distance calculation. The Traffic Management Module (TMM) makes use of thisroad map to identify various links between two RFID readers and the values of length and width ofroads on the link (or between two RFID reader junctions) and the speed limit on those respective links are obtained from the concerned road authorities.

Lastly, the traffic quotient of the road is then calculated. It is inversely proportional to:

- Length of the road,
- Width of the road and
- Speed limit for the vehicles on the road.

Instead of speed limit, average speed can be used in a few cases where speed of most of the vehicles on the road is comparatively less than the specified speed limits.

The traffic quotient is directly proportional to:

- The number of vehicles and
- The average area occupied per vehicle.

The is due to the fact that an increase in the length of the road, width of the road and speed limit for the vehicles on the road leads to a decreasein traffic quotient as it reduces the congestion. While an increase in the number of vehicles and average area per vehicle leads to an increase in congestion.These factors are most evident and important and hence were incorporated by the authors in determination of traffic quotient for the most simplistic model. Many other factors that affect traffic quotient may be considered at a later stage for enhancing the accuracy of the traffic quotient.The traffic quotient is a function of the length of the road, the width of the road, the speed limit for vehicles on the road, the number of vehicles on the road and the average area per vehicle on the road.

3. METHODOLOGY:

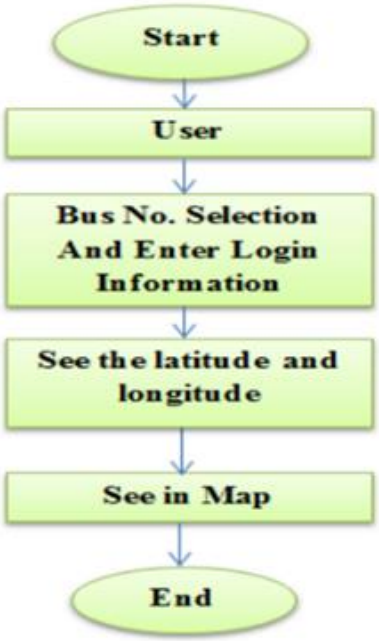

Fig.1. Work flow

1) Web Outline

- First there will be a homepage, that lists the number of cities and the name of those cities which are all available in the web application for live bus tracking.
- Secondly it redirects to a page where the user has to input any valid information about the bus like, Bus no., vehicle number or the route of the bus currently travelling etc.,
- Currently, all the responses are only saved and the web outline is full and full static as of no.

2) Set up a Database Environment:

- Set up the database that has number of the Bus, route in which the bus will be travelling, approximate starting time and destination reaching time etc.,
- The MongoDB Database works on the basis of the schema, which gives the outline or structure of the data that is to be inserted in the database. Following is an example of the MongoDB schema
- The connection between the Client side and Server side will be established in Phase II.
- In the Next phase of the project, we will be configuring the backend by creating the endpoints for our respective requests and as well as posting the data within the headers of the request sent to the server.

WORK DONE IN PHASE II:

1) Database Configure

- Creating a database that stores all the current values of the buses and safe retrieval of data
- Writing queries for fetching the righteous data.

- Completing the remaining user interface like support and social media platforms.Here, we can see that the data inserted follows the Schema we configured in the Server side of our project

2) Setting up the Map

- In this project we will be using the React-Leaflet as our map provider and OpenStreetMap will be the Tile Layer provider.
- The Current location and the route in which the bus is travelling are the parameters sent and the result will be rendered as a map component.
- When clicking on the Bus Stop there will be a popup showing the information which include the stop's name and the approximate arrival timing of the next busses.

4. Output:

The exploratory data analysis of the data set is done and the values are precisely calculated. The dashboard of the analysis for visualization is done using IBM cognos is created.A web app for user covinience is embedded with the dashboard for visualizing the results.

5. CONCLUSION AND FUTURE WORK

In conclusion, a bus tracking system can provide numerous benefits to both the transportation provider and the passengers. With real-time tracking, passengers can know the exact location of their bus and plan their journeys accordingly, which can reduce wait times and improve overall customer satisfaction. Additionally, transportation providers can use the data collected through the system to optimize routes and improve the efficiency of their operations. The system can also provide valuable insights into passenger behavior and preferences, which can be used to make informed decisions regarding service improvements. Overall, a bus tracking system can help create a more efficient, reliable, and customer-focused transportation system.

Regarding our proposed models, we still face the overfitting problem in our models. Thus, in future work, we will be developing an android application for which we have currently developed a website.

Conflicts of Interest

Authors must identify and declare any personal circumstances or interest that may be perceived as inappropriately influencing the representation or interpretation of reported research results. If there is no conflict of interest, please state "The authors declare no conflict of interest."

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