Real –Time Experiment of Intelligent Bus Monitoring System: An In-Depth Analysis Using GSM, GPS, and RFID Based Approach

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Abstract – The android base bus monitoring system using GPS and GSM methods to find the exact location of bus on google maps. Nowadays the many applications are developed for the tracking bikes, cars, devices and buses to get the exact locations. This system is mostly used to finding item which is stealed like's cars, bikes. In this system the android devices is use the GPS (Global Positioning System) System to finding the accurate positions of buses in real time on google map. To support the GPS system the android devices use the GSM system which means (Global System for mobile communication). The many peoples has problem with bus times which is regularly travel by buses. This peoples get the exact location of buses to reach the destination. The propose system help to employee for regular traveling. Nowadays everyone has the android smartphone our propose system is simple to install and use by any one. To finding the exact location of bus the android device is use the radio frequency identification (RFID) technique. In this technique the devices use the radio frequency to find the bus locations. In our Intelligent Bus Monitoring System is useful, accurate, robust, flexible and economical. The whole information of each and every bus is stored in server side database. The main objective of Bus Monitoring system is to make the flexible, cost effective and user friendly bus monitoring system that is required for daily passengers.

Keywords: GPS, GSM, RFID, Server Side, Flexible

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1.   INTRODUCTION

Todays, the many industries or companies transport the materials, peoples and goods. The sender, receiver or transport owner want see the actual positions of bus which carry the material. The owner get the actual location, required time, material conditions of bus. Now days the tracking vehicles is important for avoiding or stopping the robberies and finding the stolen vehicle. The keys of backing for worldwide economy of numerous businesses is the transportation of individuals, merchandise, and administrations. The proprietor of transportation systems no more observes the genuine development of transport. The proprietor expects a specific nature of administration as far as the security affirmation, travel time, and offices gave amid travel. Vehicular following frameworks have ended up being as a valuable innovation for transport voyager organizations with great offices. Transport data taken care with RFID and GPS.

Current procedures are used for standardized identification filtering programming in circumstances where several transport are available and the demonstration of examining every individual transport to check for legitimate arrangement can turn into a dull and wasteful utilization of organization time and vitality. With the outline and execution of a vehicle checking framework, we can radically decrease the exertion expected to screen and track countless vehicles. This model, when executed, will take into account a more productive vehicle following framework that spares time and, at last, spares cash while giving an easier GPS beacon. Utilizing dynamic RFID equipment and the medium quality of RFID collector. We planned model of following units to be utilized and understand the issues encompassing expansive scale for vehicle checking. The model integrate the capacities of RFID beneficiary with the GPS following units and a locally available installed gadget to give a finish base unit fit for following, checking, and sparing vehicle data inside one gadget. A fruitful and finish model was composed and executed through the span of this venture. The model legitimately tracks number of targeted Buses through the RFID label examining, GPS area checking and entered in vehicle data. Singular transport points of interest can be gotten to from Bus through different menus that are given object is running of the program. This will permitted to model for adjusted to the wide range of zones for utilization instead of foreordained workplace.

The system properly tracks the number of buses using RFID tag scanning, GPS location checking and entered bus information. The individual bus details are accessed by the user using different menus which is provided in the running of program. This will allow the system to adapt to many different areas for use instead of a predefined work environment.

● **GPS- Global Positioning System**

A GPS device it is the device of fetch information from the GPS system position and the time information in every weather conditions, anywhere on and near to the Earth. The GPS device needs an unobstructed line of sight to multiple GPS satellites. From an internal structure like a building, garage or tunnel Obstructed lines of sight are arise. In automobiles the most standalone GPS collector it is used. The GPS ability of smartphone it is use helped to GPS technology which used the base station and cell towers are supply the device position tracking ability, especially when the GPS signals are low, poor or not available. When the smartphone are external the range of mobile network that time mobile network are factor of the A-GPS technology it is unavailable.

● **GSM- Global System for mobile communication**

Current developed the software supporting GSM bus monitoring it is granted for this technology to replace GPS alternatives it is most correct solution for in many conditions. Even in system it is reach the position data capture using GPS, GSM bus monitoring system is grant for the transfer of powerful data such as location, speed, engine start and stop times and direction of travel etc.

● **RFID- Radio Frequency Identification**

Through the radio signals to record the data of object using radio frequency Identification (RFID) technology. It is mainly used for inventory control and timing sporting events. RFID is literally not a restoration for the barcoding system but a complement for distant reading of codes. The RFID technology is mainly used for automatically classify the person and package or an item. use the RFID tags for this. This is a small transponders. It is sending classify information in a short distance. An RFID tag used incorporated for product and RFID is an object, animal, and person to the classification and track through radio waves. From various meters and across the line of sight reader read the more tags.

2. STUDY OF METHODS

In this section different methods or techniques of Bus Monitoring system are discussed. Basically the presented methods is GPS, GSM and RFID.

O. Aloquili, A. Elbanna, A. Al-Azizi (2016)

In [1] author introducing Automatic vehicle location (AVL) it is most widely used and inexpensive. AVL it is useful for various monitoring or tracking purposes, specially that are related to tracking one bus or a fleet of buses. Using integration of three new technologies the monitoring system technology it is made possible. The three new technologies are: first is navigational technologies which is the global positioning system (GPS). The second technology is database technologies which is geographic information system (GIS). The third technology is communication technology which is general packet radio service (GPRS). The proposed system design 'tracking system' it is mostly used to point the area, speed and fuel level of the vehicle. It is make better fleet management is secure and more efficient.

Mohan Manubhai Trivedi, Sayanan Sivaraman,(2015)

In [2] author established a synergistic approach for integrated lane and vehicle monitoring to driver assistance. The techniques explained in the given paper results in final system which is improves the performance of lane tracking and vehicle monitoring module. The localizing and monitoring other vehicle on the road with the lane position for that purpose the presented technique produce the novel approach.by itself. Improvements in lane tracking and vehicle monitoring it is the mainly quantified. The Integrated system performance it is validated on real the world highway.

Süleyman Eken, Ahmet Sayar (2014)

In [3] author explain the most of the people are using public transport buses. It has experienced time loss because of buses timings, waiting long time for bus on the bus stops. The author present in this paper the proposed smart bus tracking system that use any one traveller with a their private smart phone and mobile device through the QR (Quick Response) the code reader is scan QR code which is placed at bus stops to display approximated bus arrival timing. Buses current locations and the bus routes on a map.Anyone can access these maps and option for sign up to receive alert message about expected bus arrival timing for the interested buses and related routes through SMS and e-mails.

Rajeev Kumar, Dr. Harish Kumar (2014)

In [4] author focuses the tracking equivalent services are used using distinct users and industries for enhance the day to day working of business. Using service providers or researchers the research has done and the providers to provide the exact and appropriate information to users of Vehicle monitoring

Darshan Ingle[1]* **Dr. A. B. Bagwan**[2]

Systems. This is well known reality the information is arises through related and valid data.

Wenjuan Cui', Danhuai Guo (2014)

In [5] author describe vehicle delay serves as effective criteria for evaluating and optimizing the level of service of intersections in traffic. Various methods based on analytical models, simulations, or sensors like GPS have been proposed for estimating vehicle delay. However, the absence of large scale fine-grained GPS data limits its wide application. Taking advantages of available coarse-grained trajectories of GPS tracked cabs, this paper proposes alternative definition of vehicle delay and its time series in pursuit of capturing long-range characteristics of traffic. The forecast performance of several vehicle delay series analysis algorithms are compared. A new Robust TBATS algorithm is proposed to predict vehicle delay series with outliers. 8-month trajectories of data in the city of Shenzhen, P.R. China are utilized for quantified comparison.

Pradip V. Mistary, R. H. Chile (2014)

In [6] author presents GPS tracking system.It hasmultiple application in the world. From any one location and any time an efficient vehicle monitoring system it is developed for the monitoring the movement of any one vehicle. It is use the techniquewhich one is the Global Positioning System (GPS), and Second One is the Global System for mobile communication (GSM). With the object of enabling users the modem and microcontroller are embedded and to find location of their vehicles.

Ajay Shingare, Ankita Pendole (2014)

In [7] author introduce density of vehicles on road is becoming the problem for the traffic control. Ultimately arising obstacle in the managing and tracking of the vehicle. Because of the problem state, it is necessary for every organizations and individuals to track the vehicle. People will monitor and track their vehicles for the safety concerns with the help of our Android app. Public transport and private buses tracked to citizens with traffic and transportation details like location, crowd, etc. The proposed system will be used for the positioning of the bus from remote location. The Smart Card based ticketing module which swaps the card to the smart hand held device for the transaction purpose.

Marcus Handte, Stefan Foell, Stephan Wagner, Gerd Kortuem, and Pedro Jos´e Marr´on (2016)

In [8] author presenting key challenge for continuously growing cities. To provide effective public transport service to satisfy the regular demands of users using mobile device. The Internet of Things is great possibilities to overcome existing incompliance of public transport system. It is given for its ability to embed smart technology into real life contexts. In this paper, the author displays how this paradigm is applied to the public transport domain and presenting in the Urban Bus Navigator.For the urban bus drivers use An Internet of things are enabled navigation system.The UBN provide the two novel information service for bus users: that is 1) micro navigation and 2) crowd aware route recommendation system. Micro navigation follows the fine grained contextual help of passengerwith the bus journey by recognizing boarded bus vehicle and monitoring the passenger journey progress.

Tongtong Chen, Ruili Wang, Bin Dai, Daxue Liu, and Jinze Song (2016)

In [9] author introduced Dynamic vehicle detection and tracking. It is important for different environments.In this paper, the author it is introduced a novel dynamic vehicle detection and tracking algorithm. It is the overcome this problems for the autonomous land vehicle (ALV).Which is presented to detection of the potentialdynamic vehiclewhich is scan by differencing operation. Every potential dynamic vehicle it is called novel likelihood field based vehicle calculation model.

Seung-Hi Lee, Chung Choo Chung (2016)

In [10] author introducing on road vehicle localization scheme. In this paper presented to keep and store the track of vehicle with respect to the target lane center and this is useful for the results of the camera based lane recognition.The concept of localization. it calculates vehicle state like as the advanced state space control. That are used on the constant fast rate.

Y. A. Quintero, G. Patiño and J. E. Aedo (2016)

In [11] author describes a path tracking algorithm implemented in an Intelligent Transportation System in order to validate if a vehicle is following properly a certain path previously assigned. The algorithm is based on a geometrical analysis and GPS data specified to trace in real-time the current position of the vehicle according to a previous digital map of the path to be tracked. As a case study, the tracking algorithm has been developed following the regulations of the public transportation of Medellin, important Colombian city with a large number of public buses and a significant complexity in the mobility within the city.

Ruipeng Gao, Mingmin Zhao, Tao Ye, Fan Ye, Yizhou Wang, Guojie Luo (2015)

In [12] author introducing vehicle location in real time and the records in its final location. That is not depend on GPS or Wi-Fi signals. The VeTrack it is used only inertial data and every sensing and calculating happen locally on the phone.Using the novel shadow trajectory tracing method to convert the smartphone movements

Darshan Ingle[1]* Dr. A. B. Bagwan[2]

to vehicle ones.It also detects landmarks like speed bumps and turns robustly.

3. COMPARATIVE ANALYSIS

The techniques are studied above is compared in terms of advantages, disadvantages and techniques. The Table 1 is display the comparative study from these methods. And the figure is display the accuracy comparison.

Table 1: Comparative Study of Image Forgery Detection Methods

Paper Title	Key Techniques and Methods	Advantages	Disadvantages
Automatic vehicle location tracking system based on GIS environment	AVL , GPS, GIS, CT, GPRS, GT	Automatic vehicle tracking, accuracy,	Confusing Methods and implementation.
Integrated Lane and Vehicle Detection, Localization, and Tracking: A Synergistic Approach	Active safety, computer vision, driver assistance, intelligent vehicles, lane departure, lane tracking, vehicle tracking.	Driver assistance is easy to use, easy to use	Accuracy is less, time consuming.
A Smart Bus Tracking System Based on Location-Aware Services and QR Codes	QR codes; GPS; Smart bus stops; C4.5 algorithm; Smart phones, Interactive maps	Bus stop method is successfully implement	The system rakes more time to executing.
AVAILABILITY AND HANDLING OF DATA RECIVED THROUGH GPS DEVICE: IN TRACKING A VEHICLE	PS; LBS; SPSS; Tracking; Vehicle Tracking System;	Get More accuracy compare to other	Complicated And many methods used
Vehicle Delay Series Forecast Based on Trajectories of GPS Tracked Cabs	vehicle delay series, time series analysis, forecast, route planning	Storing all information about vehicle	Time consuming.
Real Time Vehicle Tracking System Based on ARM7 GPS and GSM Technology	Global Position System; ARM7; Global System for Mobile communication; Google Earth; GUI etc.	It uses new methods like GPS, GSM	Complicated to use by peoples.
GPS Supported City Bus Tracking & Smart Ticketing System	GPS, GSM, Smart Card, Android App, Dynamic Route.	Both systems are combined to use	Confusing for new person.
An Internet-of-Things Enabled Connected Navigation System for Urban Bus Riders	Smart city, bus transport, navigation system, Passenger detection, bus ride recognition, Internet-of-Things.	Simple to use every one and new users	Time consuming.
Likelihood-Field-Model-Based Dynamic Vehicle Detection and Tracking for Self-Driving	Autonomous land vehicle (ALV), Bayesian filter, likelihood-field-based vehicle measurement model, scaling series algorithm, vehicle detection and tracking.	Use multiple methods to get accuracy	Time consuming. Not easy to use.
Robust Multirate On-Road Vehicle Localization for Autonomous Highway Driving Vehicle	Autonomous vehicle, dynamic vehicle model, multirate system, state estimator, vehicle localization.	Real time system implementation, easy to use	Many methods are used.
Path-Tracking Algorithm for Intelligent Transportation Systems	Geometrical Analysis, Global Positioning System, Intelligent Transportation System, Map Matching On-board Navigation System, Real-Time System, Tracking Algorithm.	Google map are used.	Many methods are used. The system is complicated.
Smartphone-based Real Time Vehicle Tracking in Indoor Parking Structures	Vehicle real time tracking, indoor environments.	Easy to use, accuracy is more than others.	Costly compare to others.
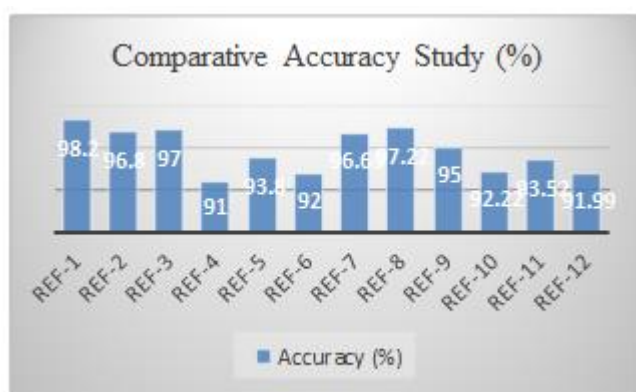
4. CONCLUSION

This paper mainly studied the overall design of bus location tracking or monitoring. The system is based on the RFID and GPS. In this work we have developed methods for bus route map that is very flexible, affordable, customizable and accurate. Using this

technology, we are enable the travel agent to track the information about their transportation service. The arrival of this technology it would make most sense for travelers and known the recent location of bus and the expected time of travel and also delay if any interruption are there to bus stop or another thing is that while standing at bus stop not having to depend on show system and this is the big contribution of our research.

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Darshan Ingle[1]* Dr. A. B. Bagwan[2]

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