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SMART PUBLIC TRANSPORT

Dr.R.Ramachandiran, M.Tech Ph.D, Priyanca.A, Desiya.S, Varsha.B.

Dr.R.Ramachandiran, M.Tech Ph.D
Associate Professor
Dept. of Computer Science and Engineering
Sri Manakula Vinayagar Engineering College
Pondicherry, India

Priyanca.A
Department of Information Technology
Sri Manakula Vinayagar Engineering College
Pondicherry, India

Desiya.S
Department of Information Technology
Sri Manakula Vinayagar Engineering College
Pondicherry, India

Varsha.B
Department of Information Technology
Sri Manakula Vinayagar Engineering College
Pondicherry, India

Abstract - *Nowadays the general public transportation just like the metro are well advanced. Passenger safety, convenience and therefore the got to improve the performance of existing public transportation is driving demand for intelligent transportation within the market. The paper based ticket system for collecting the carfare has been found to be a source of major loss in India. it's difficult to assure the acquisition of ticket by each and each passenger. A paper ticket becomes useless to the passengers when the destination is reached. Even the count of the many unsold tickets per day is extremely high. within the era of technology, India must specialise in inculcating an automatic system for collecting carfare. Hence, this paper proposes an automatic card driven system using RFID and GPS for bus journeys in India. Different scenarios concerning the implementation of this technique are discussed during this paper..*

***Key Words*: Radio Frequency Identification, Global Positioning System, IOT, Bus Fare.**

1. INTRODUCTION

Public Transport is one among the vital infrastructures of several countries. In developing use like India bus transport consists of around 70% because the town street networks is developing day-with the help of-day, the question of the thanks to acquire information about the roads is popping into increasingly tough. Vehicle global positioning frameworks were first administered for the delivery business since individuals needed to understand where every vehicle was at some random time. lately, however, with technology growing at a quick pace, automated vehicle tracking system is getting used during a sort of ways to trace and display vehicle locations in real-time. One among the important challenges that vehicle control and control programs are browsing is to understand the situation and speed of the motors on the road community in actual-time. However, bus transportation service has very poor transportation data system nowadays. Bus users don't know the precise time of arrival for a bus, but only know the scheduled approximate time of arrival. Bus transportation service doesn't have a correct system to trace all buses position and therefore the actual time of arrival in every stop. These problems occur because current bus company system didn't apply real time tracking technology to trace on each buses on the road and also lack of a platform to refresh most up-to-date transport traffic data to move clients. To tackle these issues and improve current transport administration framework, constant transport global positioning framework must create and execute. With real time bus tracking system, bus position data is connected real time and transmitted to a central server for processing and extracting transit information. the most technology wont to develop this technique is Global Positioning System (GPS) and

frequency Identification Technology (RFID). GPS technology ready to receives the position of an object from space-based satellite navigation system through a GPS receiver. For remote information transmission, GSM and SMS innovation are ordinarily utilized. The SMS technology through GSM network and GSM modem provide a user with vehicle location information. rather than using SMS, the bus tracking system uses the smart phone application to trace and monitor a bus location obtained from the in-vehicle tracking device. The bus location is automatically placed on Google maps, which makes it easier for tracking a vehicle and provides users with more accurate vehicle location information. The developed bus tracking system are going to be ready to provide bus users a true time platform to see on updated vehicular traffic information, for instance bus arrival or time of departure. Besides, this technique also reduces workload for bus management team and provides an instantaneous platform to update latest and accurate vehicular traffic information to bus users. The operations smart transportation structures the usage of RFID are often substantially progressed through monitoring the traffic operations and examine them to furnish that useful information both to the tourists and bus operating government.

1.1 SUB HEADING 1:

RELATED WORKS

Various approaches have been proposed to secure the RFID but later proved flawed.

In the work implemented in [1], the author, an enabling multi-sensor fusion-based longitudinal vehicle speed estimator is proposed for four-wheel independently-actuated electric vehicles using a Global Positioning System and Bedouin Navigation Positioning (GPS-BD) module and a low-cost Inertial Measurement Unit (IMU). Considering the fact that the horizontal speed of the GPS-BD module and the longitudinal acceleration of the IMU are highly sensitive to road gradient, a combined wheel speed- and GBS-BD-based road gradient estimator is presented to compensate for the impact of road gradient on the validity of the GPS-BD and IMU signals. Multiple sensor signals are used in combinations to form three virtual sensors, each of which generates a reference longitudinal vehicle speed track. An enabling multi-sensor fusion algorithm is then proposed to estimate the longitudinal vehicle speed based on the weight coefficients that are adaptively adjusted based on the covariance matrices of the Kalman filters. The hardware in-the-loop tests results show that the proposed multi-sensor fusion-based longitudinal vehicle speed estimator exhibit high accuracy, computation efficiency and reliability under a wide range of driving conditions.

In the idea focused in [2], author has proposed the system provides passengers real time location of the bus. Thus saving their time which would otherwise be wasted while waiting for bus. Ticketing system in the proposed system is completely cashless and hassle free. Papers which were wasted in printing tickets are saved as the proposed system provides tickets to passengers in the digital form. The analysis which were created based on simulation of the system can aid the bus management for proper planning of the bus schedule. Bus management can use the analysis to reveal some useful information from data such as frequency of passengers on each day, peak time and most used route which will help them in planning the bus schedule to increase their revenue as well as to fulfill passengers demand.

The work submitted in [3], author proposed A huge chunk of research and analysis in the domain of RFID has been carried in the recent years, enabling in the development of various new applications based on RFID. Sensible Bus Transit System allows travelers to commute hassle-free. The ticketing is seamless. Making transport additional convenient makes it additional accessible, so resulting in accumulated usage. Growing traffic density could be a drawback in major cities and effective use of public transport is one among the plethora of solutions. A seamless and easy-to-use transport system helps alleviate this problem.

In the novel method in [4], This paper presents the fusion system of radar and V2V for tracking vehicle targets, which considering the self-status and identity information of target vehicle via DSRC message. In this system, data association is modified by its identity information, and the state information from radar and V2V is fused by Kalman filter. An assessment of tracking system in real road environment shows that the proposed fusion approach for target tracking can reduce the data association errors. In the future work, we will consider that using the camera and Bayesian filter method to further improve the accuracy of target tracking.

The idea implemented in [5], A novel method for assessing the quality of vehicle tracking system using IoT is presented in this paper. Vehicle tracking system is very essential in major cities and nowadays vehicle accidents are rapidly increasing, hence this module is developed for tracking the vehicle, vehicle temperature, alcohol consumption of driver, sleepiness or drowsiness. This work survey has improved the Quality of service and security. Internet of Things (IoT), the emerging technology has benefited in facing the challenges especially for vehicle tracking system in the real world environment.

In the work proposed in [6], author has proposed IoT has evolved remarkably over a very short period of time. The existing systems can be internetworked with the various hardware platforms available in the market. The functionality of the platform varies but the essence more or less will remain the same. The vehicle tracking system as seen in this paper has its traditional roots but with the

touch of IoT. This is quite evident as various elements in the system generate data, communicate with one another and produce the outcome. In conclusion, Internet of Things announced its arrival by doing extremely well in a variety of streams across the globe. This is just the beginning and one can predict more in the coming years.

In model developed in [7] The proposed method for the GPS-track data processing and analysis is designed to provide the desired and accurate information regarding the vehicle route which can be used for the efficient modeling and optimization of the parameters of hybrid electric and pure electric powertrains. The method is based on the algorithm to eliminate the reading errors produced by the GPS receiver and to generate the tangential and normal acceleration data over a specified route. This data can be used to evaluate the requirements for the traction drives of the vehicle and optimize its parameters. Further work will be focused on the improvement of the method by integrating the additional data obtained from the embedded accelerometer to correct the accuracy of the track between the GPS reference points. In addition, it is planned to implement the three-dimensional mechanical model of the vehicle in the modeling in order to improve the optimization efficiency.

In the model implemented in [8], author has proposed the improvement of color magnification technique to this activity is still needed, it shows on big different value gap between speed identification with color magnification result and speed identification without color magnification result in some frames. Visually, color magnification still does not satisfy to make better accuration of speed value because some vehicles are identified has quite fast speed value (above 140 km/hrs.) and this phenomenon is not normal in Indonesia. The next activity will be use some robust detection on vehicle to reduce non-vehicle object be detected and color magnification with limited object area.

In [9], the author has built the paper demonstrates that acceleration information derived from GPS position sensors and OBDII velocity sensors provides a valid measurement of acceleration when compared to direct acceleration measurement. This provides the foundation for the use of these signals for the analysis of acceleration and deceleration behaviors of drivers in the Can drive dataset. This paper further shows the impact of noise on the various difference formulas used to calculate discrete derivatives, and shows that the point method provides the best performance in the presence of sensor noise even though the best performance would be expected.

1.2 SUB HEADING 2:

RESEARCH DIRECTIONS

TABLE FORMAT:

Author	Contribution	Limitation
Xiaolin Ding, Zhenpo Wang [1]	The authors enable a multi-sensor fusion-based vehicle which uses GPS and IMU. It is synthesized by employing three virtual sensors which generate three vehicle speed tracks based on multiple sensor signals. It is examined through hardware-in-the-loop tests. It uses a multi-sensor fusion-based algorithm.	• This system does not guarante e about the safety of the passenge rs. • This paper mainly focuses on only for the accurate speed of the vehicle.
Meet J Shah, Rajesh P Prasad [2]	This paper is used for automated ticket booking. It has two unit's entry gate and exit gate; it uses RFID tag and GPS which will update the location. The transaction are recorded in the database and analyzed through graphs and data through live location.	• It does not specify the bus schedule in which place does the passenge rs wants to travel. This system does not provide the facilities of the bus such as Wi-Fi, AC and it not alerts when the bus is in danger.
Pavan Telluri, Saradeep Manam [3]	In order to exhibits the Public Transport System utilizing RFID. Here the passengers are identified automatically and the fare is detected automatically	• This system does not specify the live tracking

	with GPS is to make fare more accurate. It prevents the corruption/unaccounted money.	of the bus, it only specifies the automated ticket booking. Security measures does not provided in the system for the safety of passengers.
Zhen Tian, Yufeng Cai , Shuai Huang [4]	The authors proposed system to enhances the driver safety and convenience. It proposes the vehicle tracking system which fuse the radar and the V2V information to improve the target tracking accuracy. It integrates the radar, GPS and DSRC communication equipment. The approach for target tracking can reduce the data association error and improve the vehicle target tracking accuracy.	This architecture mainly approaches for the driver safety purpose. It does not provide any facilities or features for the passengers. This method does not specifies to improve the accuracy of the target tracking
A.Anusha Syed Musthak Ahmed [5]	In order to enables the vehicle monitoring and tracking system for purpose of monitoring the migration of one place to another in order to provide safety .The proposed method depends on Embedded C programming language, the method take care of the traveller's safety by using alcohol sensor and temperature sensor.	• If the vehicle is stolen, it is difficult to judge what has be done. • If any expensive products have transported, the continuous monitoring should be done.
Neha Mangala Sivananda G [6]	This paper enables GPS antenna, GSM modem, at mega microcontroller that locates the vehicle on a map and helps to navigate the vehicle location. The system was developed on finding trouble of finding vehicles that was lost. This paper is based on Internet of Things, interconnection over a internet of computing devices.	The antenna is most critical item for successful GPS reception in a weak signal environment.
Egor kulik, Xuan Trung Tran, Alecksey Anuchin [7]	The author presents the paper as GPS track processing and analysis to obtain tangential and acceleration and elevation angle of a vehicle, driving over route with respective time. This paper is used for efficient modelling and optimization of hybrid electric and pure electric power trains.	The problem is customer will demand for minimum fuel and electricity consumption.
Septian Enggar Sukmana, Farah Zakiyah Rahmanti, Mauridhi Hery Purnomo [8]	The development of smart vehicle which exploits camera has collision detection to avoid accident is quite challenging. In this author implemented colour magnification to vehicle object. It is a compromise technique to achieve better result with some improvement in the upcoming activities.	It does not retrieve the information of vehicle movement and it cannot be useful parameter to get better accuration of vehicle speed.
Bruce Wallace, Mike Rockwood, Rafik Goubran, Michelle Porter [9]	The author demonstrates the validity of vehicle acceleration/deceleration derived from GPS and velocity sensors. This paper analyses the effects of noise on each of the derivative difference equations and show poor performance.	It may cause high frequency so that sensors are not stable while tracking the bus.

2 HEADING 2:

METHODOLOGY

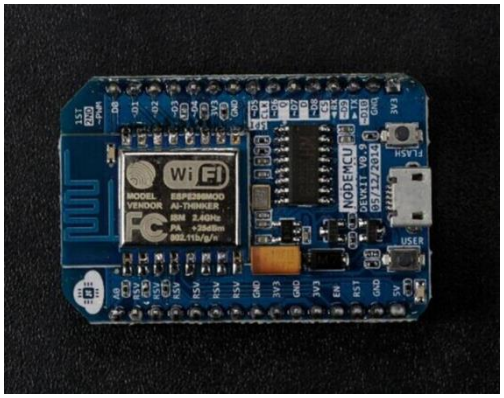
A. Technology used:

1] RFID technology - RFID stands for radio frequency identification. RFID tags are small chips that are used in our day to day life for unlocking hotel rooms, entering into cars etc. This tiny chip along with an RFID reader forms the RFID system. An RFID system consists of two parts 1) RFID Reader 2) RFID Tag.

1) RFID reader: The RFID reader has a radio transmitter and receiver within. The reader transmits radio frequency signals incessantly upon powering. It is also called as an interrogator. When an RFID tag is placed within the range area of a reader, it energizes the tag through electromagnetic induction and collects the data from it. Data is stored in the RFID tag electronically. Tags can store only a few kilo bytes of data. This data is retrieved by the reader using electromagnetic waves.

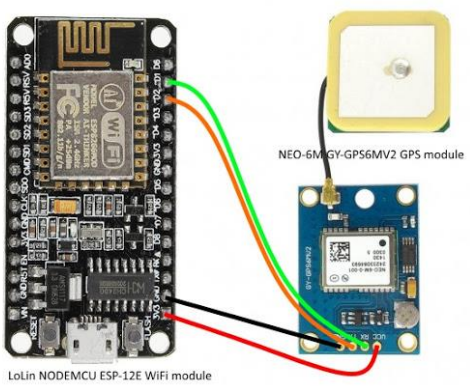
2) RFID tag: The image given below is that of an RFID tag (smart card shaped tag). RFID tags are available in different types of shapes and sizes. The Tag contains an IC for storing the information, an antenna for transmitting and receiving, and also a modulator. Tags are small in size and they can hold only few bits of data. The operation of an reader is very much similar to barcode scanning method which uses Universal Product Codes (UPC) codes. In some applications, RFID Tag and Reader has advantages over the barcode system.

2] NODEMCU: NODEMCU is an open source, computer hardware and Software Company and it is an open source IoT platform. A user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. In this project, NODEMCU is used for interacting with the GPSmodule.



Based on the literature survey we have discussed in this paper, there are many RFID techniques for preventing fraudulent.

3] GPS Module: GPS is the system for calculating positions from the signal sent by a network of the satellites. Continuously monitoring the bus by reading parameters like the speed, the route and the geographic location in real time which is uploaded to the server by the microcontroller and viewed through a mobile application.

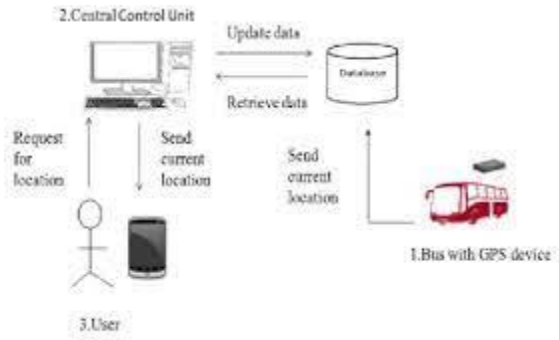


BENEFITS OF RFID IN BUSES

- An RFID smart card-based fare collection system may reduce operation costs in the long run.
- Fine amount will never be collected.
- Tickets must be taken by the user compulsorily. Well secured.
- Misuse of smart card will never happen.
- Cashless money and paperless ticket.

WORKING IMPLEMENTATION:

1. GPS is the latest technology used in various fields such as navigation, tracking and also in some of surveillance applications. Here we are going to use this GPS to calculate the distance travelled by the passenger. GPS module can configured to generate the latitude and longitude of the current position of the bus.



2. Smart cards can provide identification, authentication, data storage and application processing. These smart cards can be used as

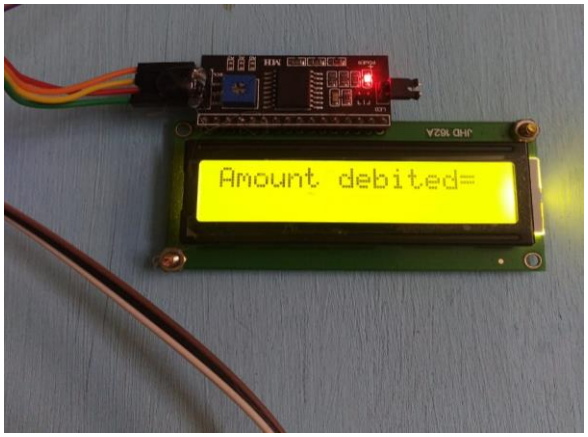
passenger identifications. Every passenger carries a smart card.

3. Every time when a passenger enters the bus, passenger needs to swipe his RFID tag/token in the RFID reader. The RFID tag has unique passenger ID, status register, balance and other blocks.

4. IR sensor is used to count the number of passengers entering and exiting. Thus avoiding the passengers commuting without tickets.
5. The card is valid, then the next step is to check the balance

6. IF the balance is less than a threshold value, then LCD displays "Insufficient balance, please recharge your card" else the passenger is requested to enter the destination point.

7. Ticketing system without human resource-Conductor is implemented using RFID tag which is rechargeable one.



3 CONCLUSION

The system is fully automated and transparent. This architecture can be implemented for all the buses, airport bounded buses in India. Smart RFID card helps to reduce chaos and ensure a better travel for passengers. This IOT app can automatically calculate distance travelled with the help of GPS with respect to the cost. The RFID card is reusable and can be avoided since the person with tickets are monitored throughout the travel. This system is implemented in metros with no complaints. This system can be implemented on public transport as well.

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