

Review on IOT based Bus Tracking System

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Submitted: 25-05-2021

Revised: 01-06-2021

Accepted: 05-06-2021

ABSTRACT—Tracking of public bus location requires a GPS device to be installed, and lots of bus operators in developing countries don't have such an answer in situ to supply an accurate estimation of bus time of arrival (ETA). Without ETA information, it's very difficult for the overall public to plan their journey effectively. This paper proposes an innovative IoT solution to trace the situation of buses without requiring the deployment of a GPS device. It uses Bluetooth Low Energy (BLE) proximity beacon to trace the journey of a bus by deploying an Estimote location beacon on the bus. BLE detection devices (Raspberry Pi 3) are installed at selected bus stops along the path to detect the arrival of buses. Once detected, the situation of the bus is submitted to a cloud server to compute the bus ETAs. A field trial is currently being conducted in Johor, Malaysia together with an area bus operator on one single path. Result of literature review shows that the detection of BLE beacons is extremely accurate and it's feasible to trace the situation of buses without employing a GPS device during a cost-effective way.

Keywords: IOT , BLE , Raspberry Pi 3 , GPS .

I. INTRODUCTION

City Bus is the most ordinarily used mode of public transportation within the India. People believe public bus to commute between home and work place. However, public buses often suffer from overcrowding, and therefore the current transportation infrastructure isn't adequately supported by the govt to affect the overwhelming number of commuters. Additionally, the general public bus network in developing cities and rural areas are mostly unreliable, and therefore the service frequency is unpredictable most of the time. Although a person's time-keeper is used at the bus depot to enforce the schedule of the bus, it falls short thanks to human errors and non-compliance by the bus drivers. With the arrival of IoT and tracking technologies like Global Positioning System (GPS) and cellular based Internet connectivity, bus fleets can now be tracked in real-time. This has provided great certainty to the commuters, allowing them to plan their journey more efficiently and hence reduce their waiting time at the

stop. The concept of Smart Bus Stop1 aims to enhance commuter experience by having enhanced cooling at the stop, also as accurate time of arrival of the buses on an information panel. An interactive chatbot is additionally deployed to permit for commuters to converse with the chatbot using various local languages and dialects, to question the bus time of arrival, weather outlook , and therefore the quickest route to their destinations. All the cool features of Smart stop require that the real-time location of the bus fleet to be available. In many City's that aren't able afford these advance solutions, bus operators aren't even thinking of putting in GPS devices and 3G connectivity on their bus fleet. Deployment of GPS devices and data connectivity on the bus fleet implies additional operating expense to the bus operators, e.g., a stage bus company between two cities may have up to twenty buses servicing the route and this suggests that the bus operator will need to bear additional cost of GPS installation and therefore the recurring data connectivity cost for every bus. On the opposite hand, bus operators that deploy GPS on their fleet are reluctant to form the buses' GPS traces available to the general public. The GPS traces are mainly used for the aim of speed monitoring, illegal route deviation, compliance to the service schedule, and generation of reports to the regulatory agency. Therefore, the crucial information, i.e., the real-time location of the bus, isn't readily available in most cases. As a result, it's impossible to supply an estimation of bus time of arrival (ETA), including the features of Smart stop in many developing countries.

In this paper, we propose a completely unique and innovative IoT solution to trace the situation of buses without requiring the deployment of a GPS device. Our solution uses Bluetooth Low Energy (BLE) proximity beacon to trace the journey of a bus along its service route. BLE beacons (i.e., Estimate location beacon) are deployed on buses to be tracked, while BLE detection devices (Raspberry Pi 4 or esp32) are installed at selected bus stops along the route, including deployment at the bus terminals. With this, the proposed solution is in a position to first track (a) when the bus leaves the bus depot, (b)

at what time the bus arrives at a specific stop, (c) estimate the time of arrival (ETA) of the bus along the route. The collected location data is then analyzed and, within the future, are often fed into a predictive analytics model to predict the bus ETA.

II. RELATED WORK

Many researchers have contributed to the development of Intelligent transportation system (ITS) for various applications like vehicle position tracking systems, vehicle anti-theft tracking systems, Bus Tracking system and fleet management systems. These applications are intended to track the system with respect to the workstation PC and Smartphone. Authors demonstrate VERTIGUO (Vehicular Track InG Using Open source approach), a GPS, GSM and GPRS technology based vehicular tracking system [1]. Authors demonstrate an SMS based vehicle tracking system to transfer the latitude, longitude from GPS and automobile data to end systems and map their exact location in Google Earth using Keyhole Mark-up Language (KML) [2][3]. Researchers have also worked on SMS tracking system with theft identification and lock feature. An intelligent vehicle tracking system (IVTS) is generally used for tracking and navigation of vehicles. These tracking as well as navigation are possible by using GPS in vehicles. Tracking provides a continuous track of the vehicle whereas Navigation guides the user to the desired destination [4]. The Real Time Bus Monitoring and Passenger Information bus tracking device is a standalone system designed to display the real-time locations of the buses in metropolitan city. This system will enable the tracking device to obtain GPS data of the bus locations, which will then be transferred to a centralized control unit by using GSM and then transmitted to a bus stop and displayed on the GLCD as per the passenger's request. For bus positioning in real time, in-vehicle unit and a tracking server GSM is used. For this, tracking server also has GSM modem that receives vehicle location information stores this information in database [5]. Four functions have been realized in this management system, such as system personnel management, vehicles management, vehicle information management, and freights information registration and inquiry. The distribution of system personnel authority and the registration and inquiry of the in-and-out vehicles & cargo information have been achieved in this management system, thereby enhanced the efficiency of the current vehicles and security, and promoted a more effective flow of goods [6].

III MOTIVATION

Part of the population depends upon the city buses to travel across the city so it is important to know when the bus is arriving or what is the estimated time to go to particular destination and which number bus is going there. For this we need to design and cost-efficient system which will give this all data to users and help them to track and plan their travel. Previously, there is a proposal called crowd source approach in order to obtain all the traces of the GPS of the public transport by all the bus passengers or any other transport. The proposed system has achieved the availability and capability of the passengers able to share the location information of the service route where the bus being travelling on and estimation time provided to the general public.

IV LITERATURE REVIEW

- 1. Development of An Android Based Real Time Bus Tracking System:** In this paper, authors propose a real-time bus tracking system for the students using Android smartphones which can be used for tracking and positioning of the buses by using Global Positioning System (GPS). This android 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.
- 2. Beacon Based Bus Monitoring System:** In this paper Sensor is used for bus arrival identification the HC-06 Bluetooth module is connected to Arduino UNO through serial communication. The details of bus i.e., bus number, route and timings can see in the smartphone through app (Bluetooth terminal). Additionally, the APR module is used in this paper, which stores the voice message about bus notification then it connects to the speaker. Whenever the visually impaired people want to know the current details of the bus, they don't need to depend on anybody. They get the information through speaker by pressing the button, which is placed in the lane.
- 3. GPS and RFID Based Intelligent Bus Tracking And Management System:** In this paper, GPS is used for obtaining the location of the bus using Google Map and RFID is used for the identification of bus. RFID card is also used here for transactions related to fuel filling. Therefore, whole information of a particular bus is stored in database at the server side. An ultimate aim of this system is to develop a flexible, cost effective and user-friendly

vehicle tracking system that can cater the needs of owner of transportation companies with minimum technologies backing at the user end.

4. **Real Time Web Based Bus Tracking System:** In this paper they proposed a new system which solves the drawback of current public transportation system. So our system handle all the data like current location of bus, management of buses and its schedule. The real time tracking of bus can be done by our proposed system and this information is then given to remote user who want to know the real time bus information. Some technologies like GPS (Global Positioning System), Google maps and GPRS (General Packet Radio Service) are used for development purpose. Our system provides web-based application, which gives real time location of bus on Google Maps to remote user.

5. **Real-Time Bus Tracking System:** This project focuses on the implementation of a Real-Time bus Tracking System (RTBTS), by installing GPS (Global Positioning System)-module devices on college buses which will transmit the current location on the GPS Receiver. Now the GPS Receiver will be interfaced with a computer and an interface driver will auto save data in a dot text (.txt) file which will continue to do so until the GPS module is connected to a bus. From here the application will retrieve data and store it in web server from where the system will display real-time information of the bus. The real-time bus tracking system is a standalone system designed to display the real-time location(s) of the buses provided by the college.

6. **Application Based Bus Tracking System:** This research is based on Bus Tracking System; the main objective of this work is to make a GPS tracking application which would be able to track school buses more accurately and efficiently than present bus-tracking systems. In the first part, the bus location is received from the satellite and then further it is processed through the Kalman filter and then it is sent to dedicated web servers with the help of cellular networks. In the second part, the coordinates received is processed through the Google Maps API. In the third part, the data received from Google Maps API is processed in user's device to show real-time location.

V CONCLUSION

This paper mainly studied the overall design of bus management system based on multi-node RFID cards and GPS. There is lot of work done for the bus tracking system in the public transportation but many of these uses similar approach like GPS and GPRS based system although this is GPS is accurate but it requires a recurring cost of monthly internet recharges to send the data to cloud using the GPRS

also for the city buses running inside the city this cost can be unnecessary as we know the Bus stands are usually situated near to each other and buses run on the limited road. Also some system suggest RFID based approach but that is also not visible as the RFID is prone to external noise and radio interference. One of the paper suggest Android application based approach but this approach is again based on the user Android phone required to send data from his phone to the bus server bus operator server. Arduino many public bus operators how cost constraints that's why they are not able to install the GPS based systems in their buses.

REFERENCES

- [1] "Beacon Based Bus Monitoring System" J.Eindhumathy¹, P.Surya², K.Sudarkodi³, B.Nandhini⁴, R.Yogasheeba⁵ International Journal of Advanced Research Trends in Engineering and Technology (IJARTET) Vol. 5, Special Issue 8, March 2018.
- [2] "GPS AND RFID BASED INTELLIGENT BUS TRACKING AND MANAGEMENT SYSTEM" Anuradha Vishwakarma¹, Agraja Jaiswal², Ashwini Neware³ Shruti Ghime⁴, Antara Marathe⁵ International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 03 | Mar-2016
- [3] "Real Time Web Based Bus Tracking System" Manini Kumbhar¹, Meghana Survase², Pratibha Mastud³, Avdhut Salunke⁴ International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 02 | Feb-2016
- [4] "Real-Time Bus Tracking System" Dhruv Patel¹, Rahul Seth², Vikas Mishra³ International Research Journal of Engineering and Technology (IRJET) Volume: 04 Issue: 03 | Mar -2017
- [5] "Application Based Bus Tracking System" Shubham Jain, Adarsh Trivedi, Shweta Sharma International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (Com-IT-Con), India, 14th -16th Feb 2019
- [6] Chadil, Noppadol, Apirak Russameesawang, and Keeratiwintakorn. Real-Time Tracking Management System Using GPS, GPRS and Google Earth, In IEEE 5th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology, vol. 1, 2008, pp. 393-396.
- [7] Dr. Saylee Gharge, Manal Chhaya, Gaurav Chheda, Jitesh Deshpande, "Real time bus

- monitoring system using GPS,” An International Journal of Engineering Science and Technology, Vol.2, Issue3, June2012.
- [8] S. P. Manikandan, P. Balakrishnan, “An Efficient real time query system for public transportation service using Zigbee and RFID,” International Journal of Research in Communication Engineering, Vol. 2, No. 2, June 2012. Ms. Rupali, D Dharmale, Dr. P.V. Ingole, "Text Detection and Recognition with Speech Output for Visually Challenged Person", vol. 5, Issue 1, January 2016.
- [9] Madhu Manikya Kumar, K. Rajesekhar, K. Pavani, “Design of punctually enhanced bus transportation system using GSM and Zigbee,” International Journal of Research in Computer and Communication Technology, Vol. 2, Issue 12, December 2013.
- [10] THIYAGARAJAN MANIHATTY BOJAN, UMAMAHESWARAN RAMAN KUMAR AND VISWANATHAN MANIHATTY BOJAN (2014), " DESIGNING VEHICLE TRACKING SYSTEM – AN OPEN SOURCE APPROACH", 2014 IEEE INTERNATIONAL CONFERENCE ON VEHICULAR ELECTRONICS AND SAFETY (ICVES), HYDERABAD, INDIA.
- [11] G. Kumaresan, J. Gokulnath “Beacon Based Vehicle Tracking and Vehicle Monitoring System” International Journal Vol. 5, Issue 3, March 2016.
- [12] Seyed Ali Cheraghi, Vinod Namboodiri “Guide Beacon: BeaconBased Indoor Way finding for the Blind, Visually Impaired, and Disoriented” IEEE transactions Vol. 15, No. 8, August 2017.
- [13] RAMADAN, M., M. AL-KHEDHER, AND S. AL-KHEDER (2012) "INTELLIGENT ANTI-THEFT AND TRACKING SYSTEM FOR AUTOMOBILES", INT. J. MACH. LEARN. COMPUTING .
- [14] MOHAMMAD A. AL-KHEDHER, (DEC 2011) HYBRID GPS-GSM LOCALIZATION OF AUTOMOBILE TRACKING SYSTEM, IJCSIT VOL 3, NO 6.