

Autonomous Informative Services for Bus Route Map using GPS and RFID

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Abstract

A vehicle tracking system has been extensively used for fleet management, asset tracking, surveillance, stolen vehicle recovery and many more. In this work we present Autonomous Informative Services for Bus Route Map a GPS and RFID technology based vehicular tracking system, that is accurate, robust, flexible, economical and feature rich.

Keywords: GPS, RFID, Bus Tracking, RFID Tag, RFID Reader

I. INTRODUCTION

Transportation of people, goods and services is a multimillion dollar industry and forms the backbone of today's global economy. The users of the transportation networks no longer see transportation as movement from point A to point B, but they are also expect a certain quality of service in terms of any transportation system is measured in terms of the safety assurance, journey time, facilities provided during travel. Vehicular tracking systems has proved to be as a useful technology in providing a certain quality of service to its consumers, by efficiently allowing them to track the location of their object of interest, along its journey. Vehicular tracking system is a very useful technology for tracking public transportation (like bus) in developing countries. Our approach 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 technology backing at the user end. This application would be a boon for the tracking cabs, goods carrying vehicles and many more. Bus information taken care with RFID and existing location taken care with GPS. The radio frequency identification (RFID) technology is a kind of advanced automatic identification technology, and is more and more widely used in the fields of transportation and logistics. The vehicle management is a purposeful, organized activity which throughout all aspects of vehicle operating. Because RFID card has lots of advantages, e.g. non-contact, read the cards stably and reliably, easy and quick operation, safe and without conflict, etc, the applications of it in transportation and logistics are increasing.

GPS technologies and RFID have been deployed towards tracking of buses in real time. In addition, RFID Technology has gained favour in transaction system usage. So considering both RFID and GPS technologies, we proposed a novel bus tracking wherein RFID tags, readers and GPS transmitters installed on buses are utilised.

II. BUILDING BLOCKS

This section describes the components used to realize our project Autonomous Informative Services for Bus Route Map architecture. It consists of two parts- the Hardware and the Software.

A. Hardware:

The hardware part consists of Transmitter and Receiver. Transmitter is placed on the respective bus and receiver is on the administrator's side. The transmitter will transmits the values of position of the bus via GPS technology and also it transmits the value of RFID tag which will be scan by our RFID reader i.e. placed on our transmitter. Both GPS device as well as RFID tag transmits the alphanumeric values. The respective information which is sent by the transmitter is received by the receiver, receiver collects this information and with the help of software part all the required output will be shown on the screen.

1) Transmitter:

A Transmitter consists of various modules like GPS module, zigbee RFID transmitter, RFID reader module and RFID tag and Relay. This transmitter will be kept on the bus and transmits the data to the receiver.

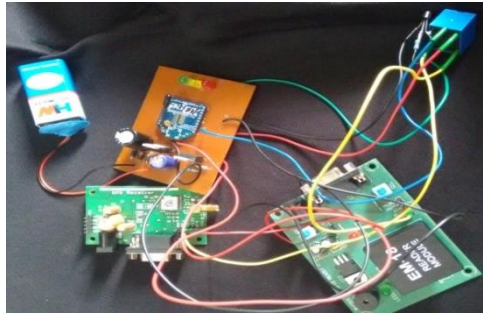


Fig. 1: Transmitter

2) GPS Module:

A GPS is made up of constellation of satellites orbiting around Earth. Each satellite has a atomic clock on its board, so it knows the precise time. As it is orbiting around the Earth, each satellite is continuously transmitting its location at 1.575 GHz. With the help of GPS receiver pointing at the sky, we can listen to these transmissions. When listening to 3 or more satellites transmissions, we can triangulate our location on earth. Finally, with the help of the GPS receiver we could find the following:

- Location
- Latitude and Longitude

3) Zigbee RFID Transmitter Module:

This module includes some subcomponents such as: RFID module(sender) which is used to transmit data from transmitter at bus to receiver at server side. The reasons for using Zigbee RFID are that:

- It requires less power of 3.3V
- It is secured
- It provides free frequency 2.4GHz
- It produces its own Personal Area Network

A 12V battery is connected to this module through which an Alternate Current (AC) is supplied. This AC is converted to Direct Current(DC) with the help of p-n junction diode and this Direct Current is pulsating. To convert this pulsating DC to smooth DC we have used capacitor filters. The whole current flowing throughout the circuit taken care with resistors. Voltage Regulator is used to provide power of 3.3V to RFID module(sender). The LEDs are used to indicate the various states of system. One is for showing Zigbee power, one is for showing connecting range and one is for indicating sending or receiving.

4) RFID Reader Module and RFID Tag:

The system is based on Radio Frequency Identification (RFID) technology and consists of a passive RFID tag. The passive micro information about the Tag ID and sends this information to the base station. The base station receives, decodes transponder tag collects power from the 125 KHz magnetic field generated by the base station, gathers and checks the information available in its Database and used to send that information. The system performed as desired with a 10cm diameter antenna attached to the transponder. RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used Reader frequency is 125 KHz.

5) Relay:

Relay is used to toggle sending of GPS data and RFID data automatically. When the bus is in motion the GPS receiver sends the values to relay and relay forward these values to Receiver and when the bus is not in motion and the RFID tag is scanned on RFID reader, it sends the RFID data to relay. Relay forwards this data to receiver for further processing.

B. Receiver:

Receiver consists of various modules like zigbee RFID Receiver and Step-down transformer. Receiver will be at the server side where all data transmitted by transmitter will be received and location is found with the help of software.



Fig. 2: Receiver

1) Step-Down Transformer:

Step-down Transformer is used to convert main 230V AC into 12V AC. This AC is supplied to the Receiver.

2) Zigbee RFID Receiver

This module includes some subcomponents such as: RFID module(receiver) which is used to receive data from Zigbee RFID transmitter at bus to receiver at server side. The reasons for using Zigbee RFID are that :

- It requires less power of 3.3V
- It is secured
- It provides free frequency 2.4GHz
- It produces its own Personal Area Network

12V AC provided by Step-down Transformer is converted to Direct Current(DC) with the help of p-n junction diode and this Direct Current is pulsating. To convert this pulsating DC to smooth DC we have used capacitor filters. The whole current flowing throughout the circuit taken care with resistors. Voltage Regulator is used to provide power of 3.3V to RFID module(receiver). The LEDs are used to indicate the various states of system. One is for showing Zigbee power, one is for showing connecting range and one is for indicating sending or receiving.

C. Software:

It consist of an panel which is attached to varies electrical devices from which a single person can handles all system from one position This operations are controlled by interfacing it using buses with a personal computer. All operations are controlled through keyboard inputs of a PC. All these executions are made possible with the help of a most powerful programming language the 'c#' language. The software is comprised of 'Visual C#' language programs when executed give. The desired physical results hence all operations can be easily managed with the PC. The software part is being build afterwards.

III. CONCLUSION

This paper mainly studied the overall design of vehicle management system based on multi-node RFID cards, analyzed the development and operation environment of the system, confirms the module settings of the system and distributes the privileges of the system. In this work we have developed AISFBRM- the autonomous informative services for bus route map that is flexible, affordable, customizable and accurate. Through this technology, we enable people to track information about the transportation service. There can be various other application that can be built over our existing platform. We have also demonstrated the credibility of the design through field trials and the initial results obtained through our prototype are very promising. but the advent of this technology, it would make more sense for commuters to know the current location of bus and expected time of arrival and also delay if any before coming to bus stop or while standing at bus stop without having to depend on display system and this has been the major contribution of our research.

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REFERENCES

- [1] thiyagarajan manihatty bojan, umamaheswaran raman kumar and viswanathan manihatty bojan (2014), " designing vehicle tracking system - an open source approach", 2014 iee international conference on vehicular electronics and safety (ieves), hyderabad, india.
- [2] ramadan, m., m. Al-khedher, and s. Al-kheder (2012) "intelligent anti-theft and tracking system for automobiles", int. J. Mach. Learn. Computing.
- [3] mohammad a. Al-khedher,(dec 2011) hybrid gps-gsm localization of automobile tracking system, ijcsit vol 3, no 6.
- [4] dr. Kamal jain and rahul goel, (2012), international conference on traffic and transportation engineering (ictte 2012) ipcsit vol. 26, iacsit press, singapore.
- [5] b. Janarthanan and t.santhanakrishnan, "real time metroplitan bus positionin system desing using gps and gsm".
- [6] chen xue-mei and wei zhong-hua,(2011), "vehicle management system based on multi-node rfid cards" proceedings of the 30th chinese control conference.