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A Smart Cost Effective Public Transportation System

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ABSTRACT: Nowadays the public transportation system like the metro are well advanced. Passenger safety, convenience and the need to improve the performance of existing public transportation is driving demand for intelligent transportation system in the market. The paper based ticket system for collecting the bus fare has been found tobe a source of major financial loss in India. It is difficult to assure the purchase of ticket by each and every passenger. A paper ticket becomes useless to the passengers when the destination is reached. Even the count of many unsold tickets per day is very high. In the era of technology, India must focus on inculcating an automated system for collecting bus fare. Also the passengers find difficult to locate he exact location of bus. Hence, this paper proposes an automated card driven system using RFID for bus journeys in India. The passenger can able to find the exact location of the bus through his mobile phone.In the near future public bus transport system with advanced technologies like Radio Frequency Identification Device (RFID), GSM, ZigBee and LabVIEW will gain spotlight due to their advantage of higher convenience and greater life standards as compared to the conventional bus systems.

KEYWORDS:RFID,GSM, ZigBee and LabVIEW

I. INTRODUCTION

Most of the people use public transport vehicles to travel in their daily life and theirtime is wasted while waiting for the public transport vehicles due to absence of vehicle exact location. The developed countries are using GPS-based techniques for smart location tracking of the public vehicles but the developing countries still in the phase of developments are trying to automate this.

GPS based tracking are mainly designed for tracking of the vehicles. These techniques provide most accurate real-time information. GPS-based techniques are used in various cash rich organizations for tracking of the position of their vehicle. In some countries, GPS devices are also used for detection of the stolen vehicles. The smart system for real-time tracking of public transport vehicles may bring the revolutionary change to the public transportation system. The tracking of the vehicles is the key aspects of the every intelligent transportation system. The GPS is a system for calculating position from signals sent by a network of satellites. To accurately determine the position and it is able to determine the strong signals.

In developing countries such as India, buses carry more than 90 percent public transport. The smart system for real-time tracking of public transport vehicles may bring the revolutionary change to the public transportation system. This paper proposes an economical approach for smart and real-time tracking for public transportation vehicles that employs RFID-based techniques for tracking of the vehicles.

Hence, this paper proposes an automated card driven system using RFID for bus journeys in India. In the near future, public bus transport system with advanced technologies like Radio Frequency Identification Device (RFID), GSM, ZigBee and LabVIEW will gain spotlight due to their advantage of higher convenience and greater life standards as compared to the conventional bus systems.

Thus, smart bus is an efficient, convenient and highly reliable system which is capable of automated ticket booking, live bus tracking and strategic planning and management, which will eventually make passenger journey peaceful, saving paper through digitalization and save the effort and time for planning

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II. PROPOSED SYSTEM

The paperproposes a cost effective and robust approach for smart public transportation system .The approach is based on RFID technology to obtain automatic fare collection system.First concept, RFID based automatic fare collection system is developed using RFID reader, RFID tag, keypad, GSM, GPS and LabVIEW technology. Each person has to carry their own RFID tag which is registered with their account.Whenever the passenger enter inside the bus, passengers have to show their card near to the RFID reader that reads their details from the card and send to the PIC micro-controller for further process. As soon as the PIC micro-controller receives data from the RFID reader then the details of that individual person will be displayed in the LCD module which is placed in the bus unit for the passenger's visualization. Keypad in the bus unit which will be used to select the destination and the destination detail will be sent to LabVIEW page to deduct the amount from that particular person's account. When the passenger enter into the bus, they should show their individual card, the RFID reader will read the data's from the card and send their details to the server through ZIGBEE. The passenger card details are maintained in the server unit which is enabled with LabVIEW software. The LabVIEW software automatically sends the SMS to passenger about travel details and deducted amount from their account. SMS will be sent to the passenger mobile number through GSM, regarding their payment and balance details.Passengers can able to know the location of the bus by sending the location request to the GSM. Using the LabVIEWsoftware location details will be sentto theirmoblienumber as SMS. Also thecurrent location of the bus will be displayed in the BUS unit LCDfor passenger's view . Passenger can able to see bus location, using the latitude and longitude value in the LCD display.

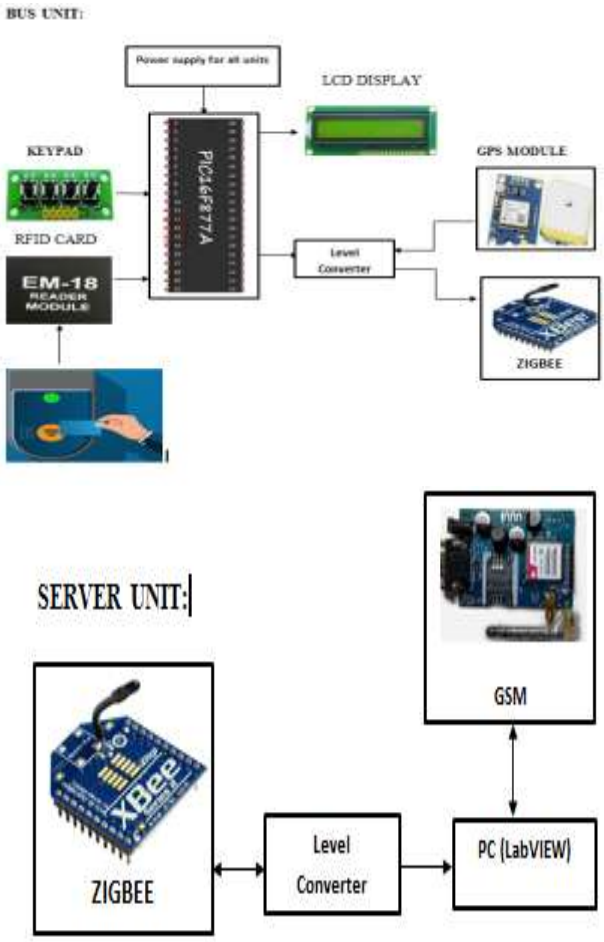

Figure1.Block diagram of the proposed system

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Theframeworkimplementationoftheproposedsmarteff ecivemodelisshowninFigure2thatconsistsofvarioussen sordevicesand other modules. PIC16F micro-controller connected with the RFID module GPS and Zigbee communication module were done with the proper connections in the effective manner. PIC16F877A advanced micro-controller containing total 5 ports of totally 40 pin IC in which 33 pins are GPIO pins and also 8 analog channels will inbuild ADC and flash memory etc… carriers the total process of project. RFID reader, GPS and Zigbee were connected to the micro-controller using UART protocol in a secured manner by level converter for avoiding data collision. Wireless communication is made between the Bus unit and server unit using Zigbee transceiver.

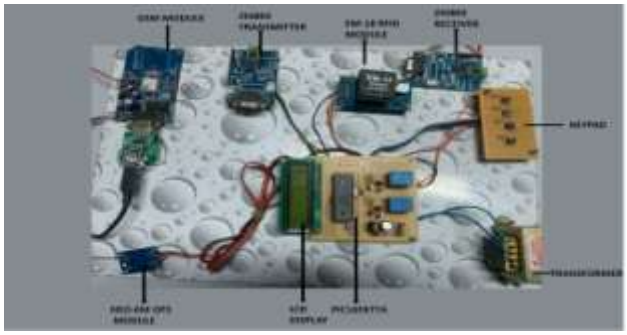

Figure2.Framework implementation of the proposed smart public transportation System

RFID reader, buttons, Zigbeetransceiver placed in the bus unit makes a smart and automatic public transportation system. Once the passenger enters the bus their individual cards will scanned and data's from the card will be read by the RFID reader. PIC controller will read the data from the RFID reader and using LCD display ask the passenger to select their destination through buttons. Thedatawillbeprocessedandsent to the LabVIEW software after destination selectionhasbeencompletedsuccessfully.TheGPS value will received and displayed in the LCD module.

Latitude and Longitude values will be received from the GPS module after getting the signal once by communicating with the satellite. Both the values will be displayed and also by comparing the values the location name will be displayed in the LCD module for passenger's visualization. Using this passenger's can able to identify easily where the bus is keep on moving.

III. DATA RECEIVING AND MONITORING USING LAB VIEW

Laboratory Virtual Instrument Engineering Workbench (LabVIEW) is a system-design platform and development environment for a visual programming language from National Instruments. In real time monitoring the transportation manually with available technology is more challenging for us to automate.Here,parameterssuchpassenger's ID along with their destination were taken from bus unit and received in the server unit for the further process.Afterreceiving the data's in the Zigbee then using the USB to TTL converter the data's will transmitted to the LabVIEW server i.e., PC.Figure 3 is the LabVIEW page designed for our project using the various tools available in the NI- LabVIEW software.

LabVIEW page is designed in way to receive the passenger's ID and their destination data serially through USB to TTL converter and to deduct the amount for their journey in that individual ID that is received along with their destination value. SMS will be sent to that particular passenger's mobile number using GSM to conform their travel cost. SMS carries the content like passengers ID along with their destination details moreover amount detected for their travel and also the remaing balance in their card. Once the passenger wants to know the details where the bus is located

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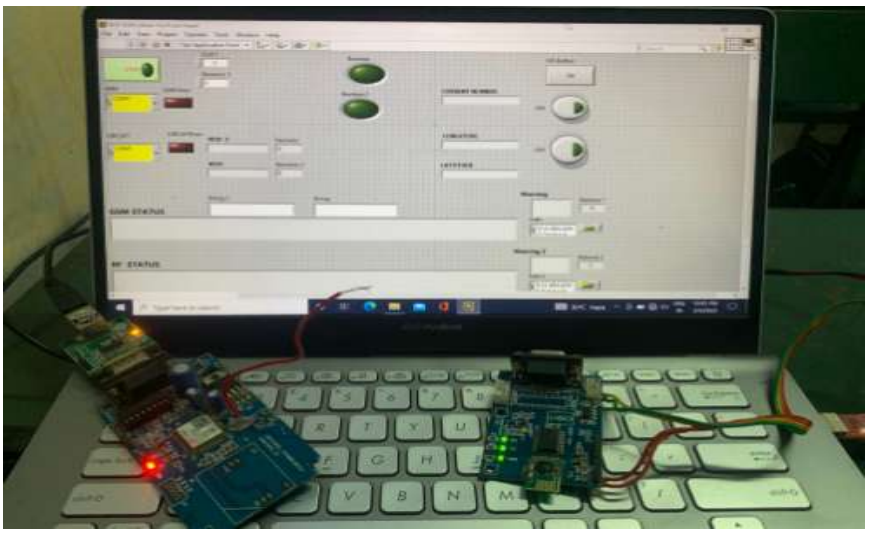

Figure3.LabVIEW page along with the Zigbee andGSM module

GPS is a hardware used in various field to navigate the location. In this paper,through GPS module the Latitude and Longitude value were found. Once the GPS is communicated with satellite, it will receive the various values, from thatthe Latitude and Longitude values were shown in the Figure 4. In figure 4 GPS value received at the different places were displayed in the LCD module. The value found in the first row of the LCD is Latitude value and the value found in the second row of the LCD module is the Longitude value. Comparing these two values,exact location name will be display in LCD i.e., in bus unit for passenger's visualization. GPS location value is also sent to the server unit from the bus unit inorder to display the location value in LabVIEW page. If SMS is received for the location request from the passenger then the latitude and longitude value will be sent to the passenger's mobile via SMS using GSM in the server unit.

IV. RESULTS AND DISCUSSIONS

The proposed approach is based on the RFID communications. Each bus terminal is installed with a RFID reader module with small processing device PIC Micro controller and each person has a RFID tag. When the RFID tag comes to the range of RFID Reader, it reads the tag and send the data to the Micro controller.Through Embedded C program we access that value then Compare and displayed in the LCD as shown in the figure 4.

Figure4. GPS values for different places

Figure 4 shows the latitude and longitude value taken from the GPS module which is placed in the bus unit. Also, this GPS value is transmitted to the LabVIEW page through Zigbee wireless communication technology. The data received in the server unit were displayed in the latitude and longitude channel of the LabVIEW page as shown in the Figure 5.

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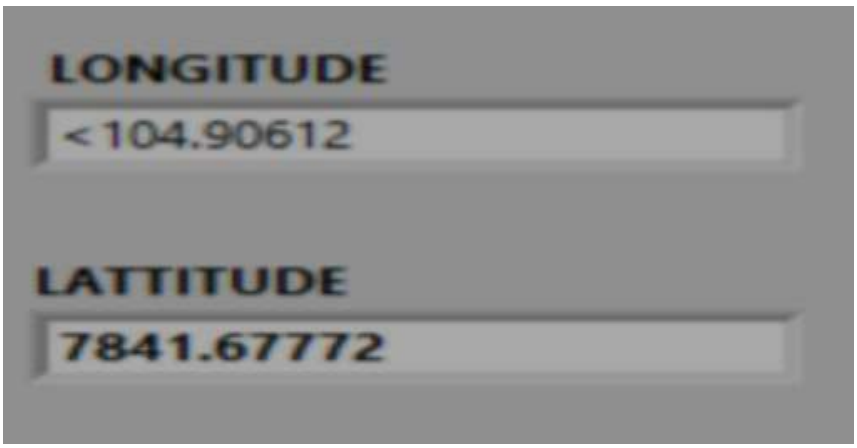

Figure5. Latitude and Longitude channel in the LabVIEW page

Passenger's will receive the SMS once they shown their card to the RFID reader, LabVIEW will deduct the amount for their travel and send the remaining balance SMS to the passenger's mobile. Once any of the passenger sends the location request SMS of the bus, then they will receive the bus location SMS from the server unit as shown in the Figure 6.

Figure6. SMS output for the Passenger's mobile.

V. CONCLUSION

The paperproposes a cost effective and robust approach for smart public transportation system .The approach is based on RFID and GPS technology to obtain the location of the vehicles. The system is able to provide the location, running status etc. of the any public vehicle that is associated with this system. The RFID reader identifies the tags with 100% accuracy, hence system is reliable. In the proposed system,the approach does not require intensive computations at the RFID reader end.Hence simple and accurate to implement. The cost of passive RFID tags is very low as compared to the GPS devices and the internet connectivity is required only on the reader node (at bus terminals). Thus, the proposed approach is suitable for third world and developing countries as compared to GPS based techniques.

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