SMART VEHICLE ACCESS SYSTEM USING SMART CARD AUTHENTICATION

Myakala Manoj Kumar[1], Nadhunoori Sukumar[2]
1,2Assistant Professor, Jayamukhi Institute of Technological Sciences, Narsampet, Warangal.
1.manojreddymyakala@gmail.com 2. sukku.0477@gmail.com

Abstract

The aim of this paper is to distinguish the data of an individual person's information that will identity the persons who utilizing the vehicle. To begin with, it introduces a concise review of existing driver and traveller ID or acknowledgment approaches, which depend on smartcard information. This incorporates posting the normally accessible tactile estimations and featuring a couple of key handy contemplations for vehicle settings. Second, a straightforward ID strategy that uses the smartcard for inertial estimations and, perhaps, entryways flag is proposed. It depends on breaking down the client information whether driver or traveller. As indicated by the client data entryways will open and close with the end goal of person entry or exit. This is trailed by applying a reasonable classifier and choice measure. Exploratory information is appeared to show the convenience and viability of the presented probabilistic, low-complexity, identification technique. The proposed framework was planned with ARM processor for programming as per the necessities. EM-18 RFID reader utilized for accepting the smart card data like driver or traveller ID along with his name emergency contact details and allotted seat number. DC motors used for access the entryways open or near to giving contributions for clockwise or anticlockwise.

Keywords: Smart card authentication, Vehicle Access control, Traveller Information and Emergency alerts.

I. INTRODUCTION

Radio-frequency identification (RFID) is an automatic identification method, relying on remotely retrieving data using devices called transponders or RFID tags. The technology requires some extent of cooperation of an RFID reader and an RFID tag. An object called RFID tag that can be applied to a product, person or animal for the purpose of identification and tracking using radio waves. Some tags can be read from meters away and beyond the line of sight of the reader. The RFID has come up as emerging technology which started evolving in World War II.

A RFID system has several components which include tags, antennas and readers. This set up can be used either in high frequency or ultra-high frequency. In 1946, Leon Theremin invented a toll for the Soviet Union which retransmitted radio waves with some audio information attached to it. Though it was not an identification device it can be considered a predecessor to the RFID technology. The IFF transponder was used by United Kingdom in 1939 which was then used for identifying planes as an ally plane or enemy plane as early in 19th century in World War II. The transponder of this kind is still used in today's aircrafts wherein the transmission and receiving of waves is used. The patent from Mario Cardullo's in 1973 which talks about a passive radio transponder attached to a memory was the true ancestor of modern RFID.

II. LITERATURE REVIEW

Due to non-availability of prior information about the buses arrival schedule, in the morning people waits on bus stops. The buses are overloaded for most of the times which often results in some kind of fault occurrence in buses and people get late further. [1] The time required to travel by bus is linked with some parameters like traffic, accidents and snow. In fact, buses are stuck in traffic and the scheduled of buses are hampered by such situations. Because of this the management of the bus schedule is a hard task. Most of the bus station used paper works or fixed schedules. Supervisors are hired at superstation to control the entrance and the exit of buses. They prepare the trip schedules and sheets containing the schedules manually which is inaccurate and time consuming. Subsequently, transport departments have no visibility on real time information about bus timings, which results in un-utilization of resources. So, all these results in dissatisfaction and inconvenience to millions of people. Therefore, accurate and timely transit travel time information is so important. This technology can be used to help the administrator to monitor the buses, the traffic while increasing the satisfaction of the users [1] Well-known examples of identification technologies include Closed-Circuit Television (CCTV) and Global Positioning System (GPS). CCTV can be deployed at each entrance gate and image processing techniques can be utilized to identify the arrival of buses, where image recognition was performed to detect the bus in traffic. Output from these tests has shown poor performance in tracking based detection (~20% precision). During the past, GPS integrated to Geographic Information Systems (GIS) was used to monitor buses traffic. GPS receiver communicates with at least 4 satellites before giving the position of the bus. It gives very good results; however, line of sight between the receiver and the satellites is required otherwise the GPS signal is going to be weaker and attenuated. This is a main limitation of this technology especially when it comes to monitor bus traffic inside an underground bus station.

Due to the limitation of these technologies, RFID can be used to track public transport service. This technology can be effectively applied for real-time tracking and identification. RFID was developed in the 1940s by the US department of defence (DoD) which used transponders to differentiate between friendly and enemy aircrafts. Since this time, RFID technology has been evolving to change the way people live and work. Use of RFID in different areas is been explored in many previous researches, from toll collection, agriculture, access control, supply chain, logistics, healthcare, and library. RFID technology can response to our tracking needs that's why we used RFID in our design to identify buses entering and leaving the bus station.

III. PROPOSED METHODOLOGY

The proposed system architecture for the bus monitoring and management system is shown in Figure 1. A black box containing RFID reader, GSM modem is equipped in the moving bus. As the bus approaches a bus station with an RFID tag, the distance between the reader and the tag decreases and causes them to interact with each other. This network communication results in data and the data obtained is sent to the Superstation via GSM.

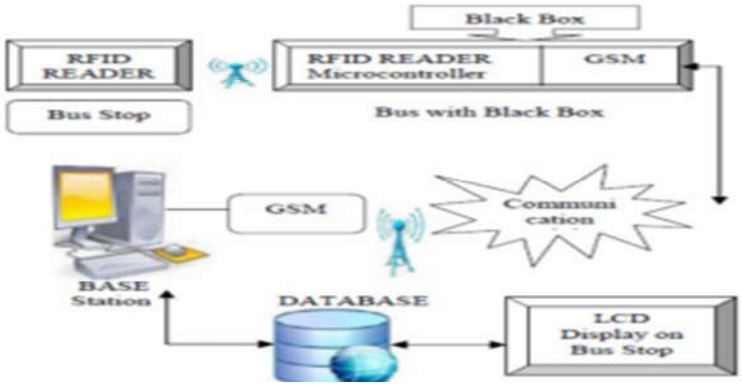

Figure 1: Architecture of Intelligent Bus Monitoring and Management System

The data circulation of the RFID and integrated communication technologies in the constructed system are shown in Figure 3. The system is automatically turned on once the bus is ignited. When the bus nears a tagged Bus-Stop, RFID devices interact with each other. The reader then reads and retrieves the information saved inside the tag once it recognizes the tag. If the communication is successful, the information of the bus and the respective Bus-Stop is saved in the database; with the condition that GSM is ON. The data retrieved are then sent to the Superstation via GSM, and this action initializes the data utilization.

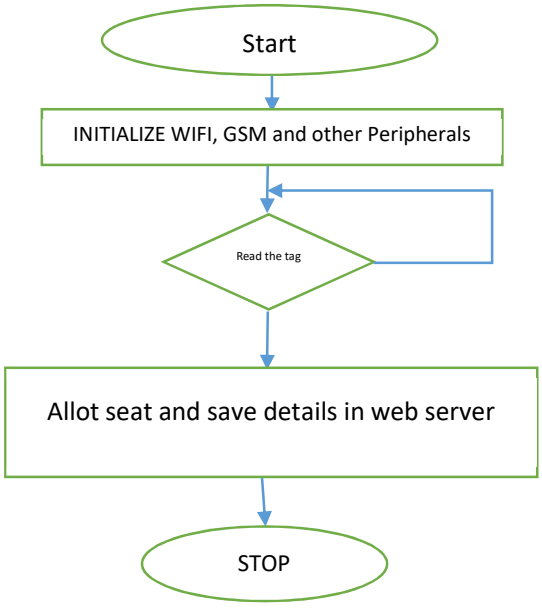

Fig 2. Functional Flowchart of Integrated System

These data are stored in the database. Filtered, clean information is sent to the Bus-Stop module, which shows the data received from Superstation i.e. bus positions on the LCD display. Bus Module is installed inside every bus and consists of a RFID reader, a GSM modem and an emergency button; all interfaced to microcontroller. After sending the initialization signal to Superstation Module, this module starts transmitting bus location to the Superstation. At each stop, RFID reader reads the RFID tag on Bus-Stop and sends data to Superstation.

In case of an emergency situation (e.g., when fault occurs in bus), driver can press the emergency button to inform Superstation units about the location of bus. The BUS station operator can then adjust the schedule accordingly and send an additional bus for facilitating the passengers. The block diagram for this module is shown in Figure 3. [1] Superstation module is the central part of the network. It accepts current location of buses through respective GSM. The PC after processing the data sends desired location information in form of Bus-Stop name to microcontroller at Bus-Stop module. Superstation also monitors the emergency situations transmitted from Bus Module.

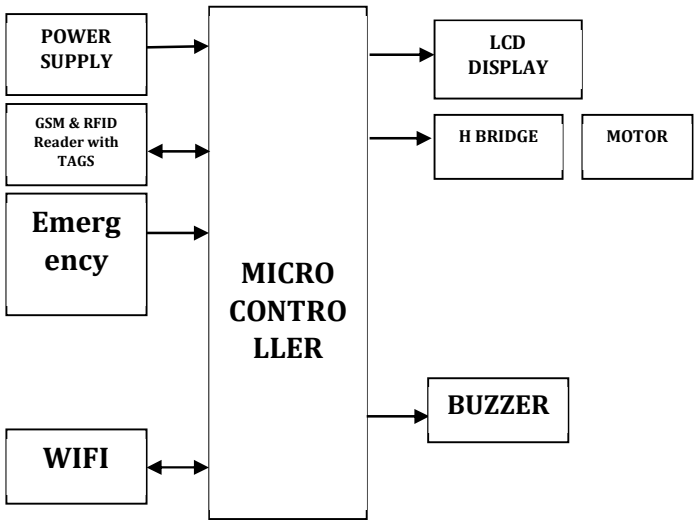

Figure 3: Block Diagram of Bus Station Module

Bus-Stop module is installed at every Bus-Stop to let the passenger know about the location of buses coming towards that stop. It comprises of a GSM modem, LCD display; all interfaced to microcontroller. Microcontroller after retrieving the stored information displays it on LCD display.

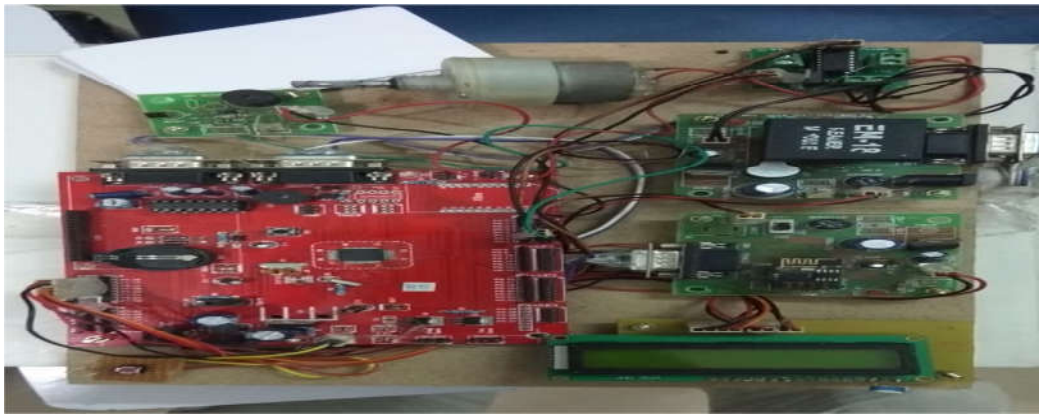

Figure 4: Working Model of Superstation Module

In case of any emergency, the respective information is displayed on Bus Stops. The block diagram of this module is shown in Figure 5

IV. IMPLEMENTATION

Several components are used in our tracking system. For identification, every vehicle has been provided with 8 bit RF transmitter. Different 8 bit words are transmitted by buses of different routes. The buses of same route may have same transmitting code if there are large numbers of public vehicles to be tracked in large cities. We have used the microcontroller unit which integrates RFID receiver and GSM unit placed at every bus stop. Every bus stop has 8 bit RF receiver along with GSM modem installed to send and receive data. Whenever any bus comes within the range of about 100 feet of the bus stop, the receiver receives the 8 bit word sent by the transmitter in a bus, which is kept continuously on. Thus information routing is done using the microcontroller unit which integrates RFID receiver and GSM unit placed at every bus. The microcontroller units used at different bus stops are programmed such that they contain GSM number of the modems placed at further bus stops. The communication between microcontroller and modem is done using USART (Universal Synchronous Asynchronous Receiver and Transmitter). The interfacing of RF receiver data with GSM modem is done using microcontroller unit. The eight bits signal received at receiver are then sent to microcontroller which decodes it and depending on the bits received sends the AT commands to the GSM modem required for forwarding vehicle location information to central server and next stops. The algorithm used for various microcontroller operations is as follows,

V. CONCLUSION

In this research work, design and development of a low cost transportation management system based on integration of RFID and GSM data is described. The system makes use of various modules which are wirelessly linked with GSM modems. SMS service of GSM network very cost effective so it is used for the transfer of data between the modules. This service provides the user with the information about location of desired buses so that the user can adjust his schedule accordingly. This technology outdates the need of waiting at the Bus-Stop thus saving a lot of time. Displays are used at Bus-Stop to let passengers know the expected time to arrive and bus locations coming towards that stop. The system made such that it can also handle the emergency situations e.g., tire of bus is punctured, in case some kind of technical or non-technical fault in bus, the operator at bus terminal is informed and the departure time between the buses is reduced.[5]It is believed that by the implementation of this system, problems such as un-utilization of buses and waiting time at the bus station will be reduced. So, both bus station administrators and passenger will benefit from the system as real time information is provided.

VI. DISCUSSION ON LOW COST SOLUTION

Efforts have been taken to reduce the total cost of the system including devices and services. Starting from small transport systems to larger transport systems, the devices and services cost can be made affordable. The different components used are 8 channel Radio frequency transmitter and receiver, GSM modem, interfacing controller unit and display unit which make the overall system cost effective. By using SMS for communication, the service cost has been reduced drastically.

Most operators are providing SMS services at very cheap rates. Thus components and service cost of the system is much lesser than other tracking systems available in market.

VII. FUTURE SCOPE

An automatic route guider display can be installed in buses to better update the alternative route in case of serious road congestions. We can connect RFID reader wirelessly to the host application. There are many wireless technologies that can be used such as Bluetooth (802.15.3) and ZigBee (802.15.4) to extend the range of an RFID reader. Fare collecting system can also be automated by providing another mobile service to which all the passengers using public transport are subscribed.

REFERENCES

[1] Mahammad Abdul Hannan, Aishah Mustapha,Abdulla Al Mamun, Aini Hussain, Hassan Basri, "RFID and communication technologies for an intelligent bus monitoring and management system"

[2] Ben Ammar Hatem, Hamam Habib, "Bus Management System Using RFID in WSN", European and Mediterranean Conference on Information Systems 2010

[3] Akshay Bal, "RFID Based Identification System", April 2009

[4] Lv Zhian Hu Han, "A Bus Management System Based on ZigBee and GSM/GPRS", 201O International Conference on Computer Application and System Modeling (ICCASM 2010)

[5] Umar Farooq, Tanveer ul Haq, Senior Member IEEE, Muhammad Amar, Muhammad Usman Asad, Asim Iqbal, "GPS-GSM Integration for Enhancing Public Transportation Management Services", 2010 Second International Conference on Computer Engineering and Applications

[6] José I. San Jose, José M. Pastor, R. Zangróniz, Juan J. de Dios, "RFID Tracking for urban transportation using EPCGlobal-based WebServices", 2013 27th International Conference on Advanced Information Networking and Applications Workshops

[7] Teki. Naga. Padmaja, Tejavath. Renuka, Anantha. Sushmitha. Srilakshmi, "Design of GSM Based Smoke Detection and Temperature Monitoring System", International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 4, April – 2013 ISSN: 2278-0181

[8] Bo Yan, Danyu Lee; "Design of Sight Spot Ticket Management System Based on RFID", pp. 496 - 499, 2009 International Conference on Networks Security, Wireless Communications and Trusted Computing.

[9] Bernard Menezes1, Kamlesh Laddhad , Karthik B. KReSIT, "Challenges in RFID Deployment – A Case Study in Public Transportation" http://www.it.iitb.ac.in/~kamlesh/Page/Reports/iceg06.pdf

[10] Teki. Naga. Padmaja, Tejavath. Renuka, Anantha. Sushmitha. Srilakshmi, "Design of GSM Based Smoke Detection and Temperature Monitoring System", International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 4, April – 2013 ISSN: 2278-0181