

RFID Based Bus Ticketing System

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Abstract – In today's world, bus transport system has problems due to paper-based ticketing system, the conductor cannot travel throughout the bus if there's rush and there are many cases of someone losing a ticket. The money change causes quarrels among passenger and conductors and the main problem is paper pollution caused due to paper waste. These problems are solved by making much more public friendly system which will provide a systematic travelling experience. With the help of RFID cards and scanners, a passenger will be validated or authorized to travel in bus.

Keywords – Arduino, LCD, RFID cards, Wi-Fi module, RFID reader.

I. INTRODUCTION

Internet of things (IoT) is the interconnection of software and hardware which enable the objects to connect and exchange data. In today's world, the transport system plays a major role in an individual's life. People use transport systems to travel to offices, schools, colleges etc. But as the technology keeps on upgrading from time to time, similarly the bus transport system which is most used for transporting means also needs to be updated. Currently, we have a system that includes distribution of tickets by conductor to the passengers manually. But it is now not appropriate for the growing crowd. As there are many problems faced like there's a lot of confusion between passengers regarding the fare and money changes which eventually results in quarrels. In addition to this, as the crowd keeps on increasing the conductor is not able to move throughout the bus [7- 10]. The paper waste caused due to thrown tickets is also a problem to look for. Hence, there needs to be a system which analyses all these problems and keeps up with the demand of the growing crowd.

II. LITERATURE REVIEW

In paper [1], system automatically deducts passenger's fare according to distance travelled by him. As RFID cards are reusable, they are much more convenient compared to paper-based ticketing system. Fare calculation is done on the basis of the GPS co-ordinates sent to the server. Database is created which stores unique ID of RFID cards which a person holds along with his personal data.

The authors in [2], explains that each bus will have a reader that is connected to the main server for charging tickets fare from the passengers through a keypad attached with reader on which passengers give information of their

source & destination locations. The advantage of RFID cards has low cost, easy operation, portability & durability. It also has disadvantage that every passenger has to enter their source & destination locations which will result in time delay & chaos.

The author- Mr. Mohammad Osman [3] explains two PIC microcontrollers M1, M2 are used. M1 is interfaced with Zigbee, LCD & control switches while M2 is interfaced with RFID, GSM, GPS. The control switches are used for providing route details in case of any route diversions & for opening/closing the doors. GSM, GPS (coordinator system) are used for tracing the bus from the base station. Zigbee and M1 are used to make synchronization with bus stop & displaying it on LCD. Base station module contains a GSM interfaced with PC together known as coordinator system, used for tracking the bus and showing the route diversion request and emergency situations and also used to give the response for route diversions.

In paper [4], passenger count is done using IR sensor and calculating the distance automatically using motor and u-slot sensor, and corresponding amount if debited from RFID card. In addition, the occurrence of accident information is automatically transmitted to nearest hospital using GSM and GPS. Initially, IR transmitter and receiver are placed straight to each other so the transmitted IR rays are received by IR receiver. This paper has advantages of counting the number of passengers entering the bus through IR module. It also has disadvantages that destination should be entered by the passenger in a keyboard which will result in long queues.

In paper [5], bus systems are operated by state run authorities or by private parties. Proposed research work is on dynamic scheduling of buses from point of view of passenger tracking pattern, which would be noted and included in planning and scheduling by means of

intelligent agents. By using RFID card and readers, passengers can be made to get details on the number of persons in a bus at any particular time. This information would then indicate the underutilization, optimum utilization or overloading of service.

In paper [6], the system uses Google's General Transit Feed Specification(GTFS) which is a ZIP file consisting of multiple text files. GTFS defines a common format for bus routes, stops, trips. RFID card is scanned at the entrance & again at the exit & corresponding fare is deducted from commuter's account. Android application is used for passengers to check location & occupancy estimate of bus they intend to board. The advantages include that the commuters can track the position of their desired bus in real time through an Android app, and get an occupancy estimate of the bus. It has disadvantages that it is only applicable to transit system for which a GTFS feed is available.

III. METHODOLOGY

In this paper, we present a system which will be automated and efficient where we will make use of RFID methodology through which user just have to scan his provided unique ID during his travelling. The system uses hardware components to take the input from the user and validate it using the website hosted on a web server. The web server will store the details of the user.

IV. SYSTEM ARCHITECTURE

The system works on RFID technology using different hardware and software methodology. The user is assigned a unique RFID card. For this user have to register on the website providing his details which includes name, address, phone no and other details. The website includes user login id, user details, his transaction details and updates the user balance. The user will place the RFID card on the RFID reader attached at the entry of the bus. The reader will scan the RFID card of the user and sends the details to web server. The details will be sent by the WI-FI module to the web server attached on the circuit. The user will be authenticated by the web server and at the same time the user will choose the source and destination on the keypad. The web server will deduct the balance accordingly for the distance chosen by the user from his account balance and update the balance by displaying it on LCD screen at the user side. The RFID will be interfaced with Arduino with the help of which cards will be scanned. Basic architecture diagram of the system is shown in Fig.1

Hardware Description

1. RFID Tag- The tags contain electronically stored information. RFID tags contain an integrated circuit and an antenna, which are used to transmit data to the RFID

reader. These cards can be of different sizes and range. The tag has a unique number assigned to it.

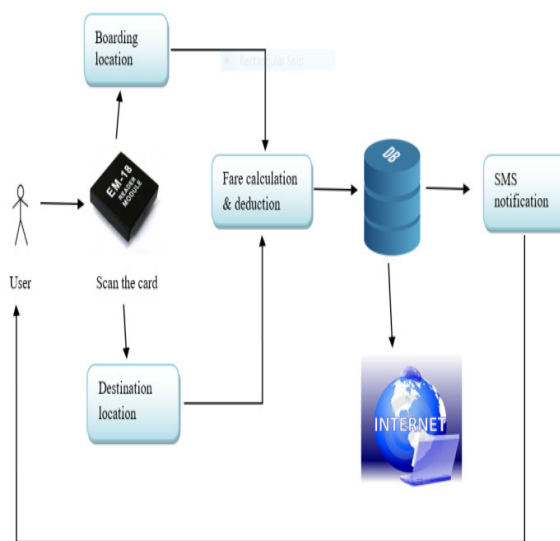


Fig. 1 Architecture diagram

2. RFID Reader- The reader converts the radio waves to a more usable form of data. Information collected from the tags is then transferred to a communication interface to a host computer where the data can be stored in a computer system.

3. Wi-Fi Module- The ESP8266 Wi-Fi module is a self-contained SOC with integrated TCP/IP protocol stack. It is used to send or receive data and regularly upload data to the computer system. It sends the data sent or read by the RFID reader to the database.

5. Arduino- It is a micro controller based on the ATmega328P. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ISCP header and a reset button. It can either operate independently (thereby giving your computer access to sensor data from the outside world and providing feedback), or connected to other Arduino's, or other electronic devices and controller chips.

Display unit- Display unit is used to display the transaction details which will make the whole process interactive. Cheapest display unit available is LCD. Here we use 20x4 Character LCD display is built-in with RW1063 controller IC which are 6800, 4 line Serial Peripheral Interface or I2C interface options.

V. CONCLUSION

This paper presents a convenient and reliable system for public transportation. Since, RFID cards are reusable and accurate as compared to paper-based ticketing system. Traffic is a growing problem in major cities and effective

use of public transport is one of the solutions. Database for passengers were created and accessed via internet through Wi-Fi module.

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