SMART BUS MONITORING AND TICKETING SYSTEM USING IOT

Shanmugapriyaa R[1], Sowmya A[2], Sowmya S[3], Sriram S R[4]

[1-4]Department of Electronics and Communication Engineering, Easwari Engineering College, Chennai, India.

---***---

Abstract - *Bus transports are the most popular and advantageous method of transportation in urban communities. It is one of the cost-effective methods of transportation. The principle hardships caused in urban transports are the group and ticket charges. It makes travelers awkward to stand nearer and it is uncalled for additional charge on the ticket fares. So as to overcome such circumstance, we are executing a shrewd transport framework; it helps in knowing the accessible number of seats in the transport and furthermore gives a programmed tagging framework. This aids in giving an agreeable ride to the travelers just as if there should be an occurrence of crisis, for example, an accident happened, the GPS area will be sent to the close by emergency clinic and the entire framework will screen under 24/7 from the principle station utilizing IOT*

Key Words: **Smart bus, Ticketing system, GPS location, IOT**

1. INTRODUCTION

Urban transport administrations are generally sent in urban communities around the globe and it gives financially savvy and monetary open transportation. The main benefits of using public transportation are the reduction of air pollution, traffic congestion, and increased fuel efficiency. Considering the existing system at 2016 the navigation routes were developed. The passenger can view all the route details and navigation of buses using the mobile app. Even the timing of bus arrival can be viewed using mobile [1]. In 2018, different parameters such as temperature, fuel level, speed, alcohol were also monitored [2]. Later the crowd density was taken into account and this density can be viewed by every passenger along with the traffic information about the arriving buses using IOT technology [3]. The information about the accident along with the above said parameters were also monitored. [4] [5].

In 2018 QR technology was the main thing used in the urban bus system for various purposes. QR code scanned by every passenger and the number of tickets will be entered by the passenger and the respective amount from the user bank account will be deducted [6]. The method using RFID technology has been developed and it is implemented in school buses to ensure the safety of the children. It helps the user to check the status of security appliances using IOT. It also checks drunk and drive, speed control, accident along with a missing child and

inappropriate drop information using RFID [7]. RFID technology has been used in the urban bus system at the entry and exit point of the bus, which allows the passenger to buy tickets using provided RFID tag before entry. It is an efficient method nowadays [8]. And these parameters can be monitored using IOT using cloud server. This helps in the maintenance of a complete data of the bus transportation system [9].

However, it has many deprivations towards the comfortability of the passengers. Due to the overload of passengers in the bus it creates an unsafe place as well as it can also lead to many accidents. And even it happens to overcharge in transport tickets on the bus fares through manual methods. In the existing urban transport system, it gives all the required data, for example, bus routes and bus location and furthermore the crowd density, yet none of the framework fulfils the fundamental need of the traveller, for example, suggesting the quantity of accessible seats and to give an answer for conquering the additional bus fare charges. The current system helps in an overall satisfaction of the riders and not the individual needs and the comfort. Nowadays, urban buses play a vital role in providing an economical transportation system for many passengers. The embedded system plays a major role in the development of the existing system and helps in overcoming the deprivation of the passenger comfort. Internet of things helps in the transformation of the old technology; it mainly reframes the old technology and provides a better way to automate the existing system.

2. EXISTING SYSTEM

In the existing methodology, it determines only the density of the crowd in the bus. It determines the speed level, fuel level, temperature of the bus using IOT. In the existing system, the bus tickets are provided by the bus conductor and monitoring the traffic and bus routes are done. Information about the crowd level, fuel detection, location of the bus is sent to the bus information server. The location of the bus is monitored and the location will be viewed on our mobile and also the crowd level can be detected to avoid bus crowds. Research on public transportation has generally focused on strategies to improve the efficiency of the physical vehicle framework. The disadvantages of the existing system are possibility of over fare on ticket charges, the system is applicable only for comfort journey, not for secured journey, the exact count of passenger in the bus is not provided and advanced accident alert system is absent.

3. PROPOSED SYSTEM

This paper presents, urban bus monitoring and ticketing system using IOT. Different parameters are being monitored using various sensors such as IR sensors and vibration sensor. An improvised method for generation of the bus ticket is implemented that no more overcharging can take place, and softcopy of the generated ticket will be sent to the user's pre-registered mobile number, so that no more loss of ticket will occur. Further, during any accident on the bus, the GPS location is immediately tracked and sent to the nearby hospital. The overall system can be monitored from the main station.

3.1 Block Diagram

The block diagram of the overall system is shown in Fig-1. Arduino AT MEGA 2560 is used as a microcontroller. IR sensor is used to calculate the number of available seats and it is displayed using the LCD and two LED lights are used to indicate whether the seats are full or vacant. If the seats are full then the red LED will be turned on or if it is any vacant seats, then the green LED light will be turned on. The RFID reader is used to automate the taking of transport tickets without the help of the conductor. Once if RFID tag is shown to the RFID reader and the destination chosen by the passenger using the provided buttons, then the amount of the ticket for the respective distance will be reduced from the RFID card and softcopy of the ticket is directly generated to the user's mobile number. Vibration sensor is used to detect any accident occurred and it shares the GPS location to the nearby hospital. All these activities are monitored by the main station using IOT. Wi-Fi module is used for sending monitored information using IOT to a mobile website. The outcome of each module and sensor are given in Table-1.
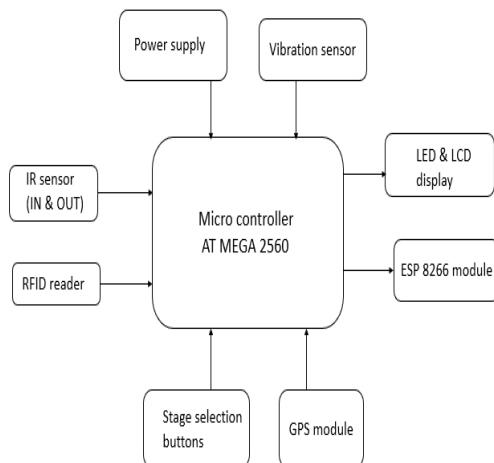

Fig -1: Block diagram of the system

Table -1: Module Description

MODULE	OUTPUT
IR sensor	Accurate number of available seat count displayed using LCD
RFID tag and reader	Generation of ticket and reduction of respective amount from the user card balance.
Vibration sensor	Accident detection.
GPS module	Latitude and Longitude of accident spot or location.
ESP 8266	Generation of ticket softcopy to mobile, location showing to nearby hospital and web monitoring from the main station.

3.2 IR based seat counting

In the proposed system IR based bus seat counting is done. The existing methodology provides information only about the crowd density and not the accurate number of available seats. By providing accurate numbers of available seats it makes the riders comfortable and either passenger has to wait or choose another option to ride. This helps to avoid the overloading of the bus and does not give space for crowed environment. IR sensor is fixed on the entry and exit point of the bus. IR sensors have two LEDs which are nothing but IR transmitter and IR receiver. These two devices are placed directly straight to one another so that IR transmitted rays are received by the IR receiver. At the point when the traveller goes between IR transmitter and receiver, the continuous rays are interrupted. By this way the number of available seats can be calculated and displayed outside of the bus using the LCD display. Hence the IR sensor accurately monitors the available number of seats and space and displays it on the outside of the bus. Then another two colours red and green LEDs are used on the outside of the bus, which indicates whether the seats are full (red) or vacant (green).

3.3 RFID ticket generation system

RFID is used for generation of the ticket by recharging it. This RFID reader is fixed on the entry on the bus and each passenger has the RFID tag. If the RFID tag is shown to the RFID reader and the destination has been pressed by the passenger using the provided buttons then automatically the fare for the respective distance will be reduced from the RFID card. Then the softcopy of the tickets will be generated to the user's registered mobile number is shown in given Fig-2. This proposed system helps in overcoming of the existing method of overcharging on the ticket fare by the conductor and losing of the ticket

hardcopy. This proposed system acts unmanned (without conductor) and tickets can be generated by every individual user by themselves. This process helps to take tickets without the help of the conductor.
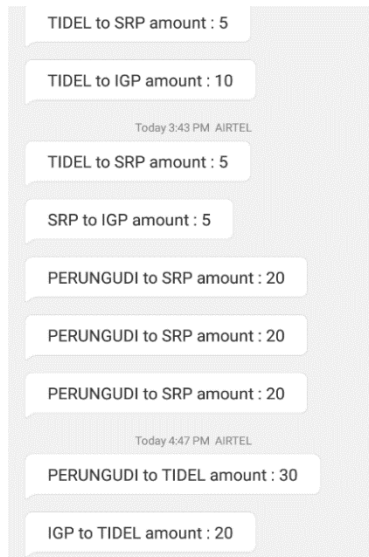

Fig -2: Ticket softcopy generation sent to mobile

3.4 Accident detection and tracking

In the proposed system we use piezoelectric vibration sensor for any accident detection, and in case of any emergency the GPS location with respective latitude and longitude will be sent to the nearby hospitals is shown in given Fig-3 so that immediate action can take place.
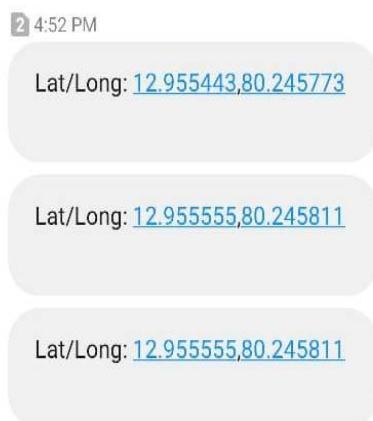

Fig -3: GPS location

3.5 IOT based monitoring system

Internet of things plays an indispensable role in updating the acquired data from the system to the main station. This can be viewed using a Website created and one can access the needed data from the station. This provides an efficient system of monitoring the overall urban bus network and can provide a comfortable platform for the urban bus riders. The passenger count, location of the current bus stop and the detection of accident location are all viewed from the main station using the website created with the help of IOT are shown in given Fig-4. It helps in giving a more secure ride to all the travelers and aids in fulfilling every single individual need.
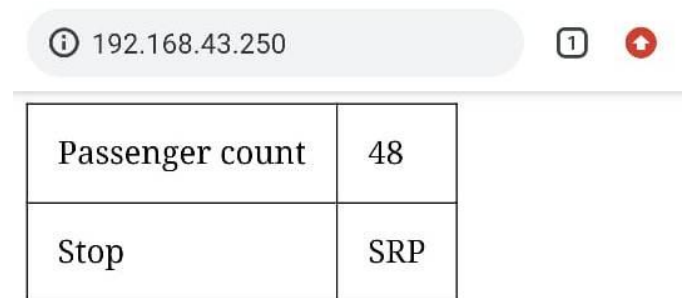

Fig -4: Main station website for monitoring

4. CONCLUSIONS

This paper presents a vital way to overcome the deprivation faced by the urban bus passenger. This smart bus system enables the passenger to know the available number of seats and space using a display board and it is indicated by Red (full) and Green (empty) LED lights. The bus riders can generate their own tickets using their RFID tags and the softcopy will be generated and sent to the user's mobile phone. And in case of any emergency condition such as accident the GPS location will be sent to the nearby hospitals. IOT monitoring of the bus can be done from the main station. So, this helps in providing a safer ride for all the passengers and helps in satisfying each and every individual needs. As a future work, the RFID reader can be fixed outside the bus and if the passenger shows their RFID tag while entry and exit, the amount based on their respective travel distance can be reduced from the card at the exit.

REFERENCES

[1] Marcus Handte, Stefan Foell, Stephan Wagner, Gerd Kortuem and Pedro Jose Marron, "An Internet-of-Things enabled connected navigation system for urban bus riders", IEEE Internet of Things Journal, vol. 3, no. 5, Oct. 2016, pp. 735-744.

[2] Vishal, Pawar and Nilesh P Bhosale, "Internet-of-Things based smart local bus transport management system", in 2018 Second International Conference on Electronics, Communication and Aerospace Technology (ICECA), IEEE, March 2018, pp. 598-601.

[3] Devi Mukundan and P Ezhumalai, "Crowd conscious IOT enabled smart bus navigation system", International Journal of Computer Science and Information Security, vol. 16, no. 3, Mar. 2018, pp. 168 - 173.

[4] M Gowsalya and A Ponraj, "An urban bus navigation and embodying ideas for urban bus rider using IOT", International Journal of Advance Research in Science and Engineering, vol. 7, no. 2, Feb. 2018, pp. 23-28.

[5] P. Julian, Sruthi Ravikumar, Sowmya. S, zoharaa. Sand Preethy. P.M, "An UBN (Urban Bus Navigation System) and embodying ideas for urban bus riders using IOT by using GPS, GSM, IR Technology", International Journal of Engineering Science and Computing , vol. 8, no. 3, Mar 2018, pp. 16345 – 16348.

[6] Mr. Jayakumar. S, Raviteja. S, Yadhu Krishna. P. B, Sushovan Bhattacharys and Adipta Biswas, "Smart bus management system using IOT", International Journal for Research in Applied Science & Engineering Technology, vol. 6, no. 4, Apr. 2018, pp. 4817 - 4827.

[7] Ajit Jadhav, Ashish Shinde, Nilesh Nanavare, Ganesh Ranmode and A. B. Gavali, "RFID based secure smart school bus system", IAETSD Journal For Advanced Research In Applied Sciences, vol. 5, no. 3, Mar. 2018, pp. 127 - 134.

[8] Aman Kaushik, Kumar Sanu, Kajol Singh, Aayush Raj and Sumitra Kumari, "RFID based bus ticket generation system", International Research Journal of Engineering and Technology, vol. 6, no. 7, Jul. 2019, pp. 1535 - 1538.

[9] J Jalaney and R S Ganesh, "Review on IOT based architecture for smart public transport system", International Journal of Applied Engineering Research, vol. 14, no. 2, 2019, pp. 466-471.