

## Computerized RTBS System

### Railway Ticket Booking and Security System

Guided by

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**Abstract:** Computerized RTBS (Railway ticket booking and security) system introduces easy ticket booking without any time lag and ensures security for the passengers by avoiding intruders. In this system; the UID number of AADHAAR card is linked with the RFID card (each RFID cards has a unique number) and is issued for passengers. This RFID card incorporates with a travel account and which can be recharged using Debit Cards whose values are input directly to a PC interface. This card also ensures E-tickets for reservation and general classes. A single RFID card can be used for a lifelong journey. The ticket issuing problems can be reduced. We fix RFID card readers in each bogies of the train and various other centers where the people can confirm their tickets. All these card readers are linked together; so that the information of passengers is shared between the readers. This helps the authority and even the passengers to know who all are travelling and current reservation status etc. The authentication system equipped in front of each compartment acquires data from the reservation counter using RF transceiver. While a passenger enters to a compartment without an RFID card, a warning alarm will be given to the railway security and this information is sent to central control system for further indication.

#### Major Features:

1. Security: terrorists and persons without ID can be prevented.
2. Manual power can be avoided for a limit (TTR, ticket counters etc.)
3. Avoid the queue and rush in counters.
4. Helps to increase profit of railway by avoiding ticketless travelling.

### 1. INTRODUCTION

In present state most ticketing was through manually issued pre-printed card tickets or paper tickets. As the numbers of trains running and the passengers travelled increased over the years, the logistics of indenting, procuring, distributing, stocking, issuing and accounting for such a large number of tickets, posed a formidable challenge to the Indian Railways. Another issue is the security system provided by the railway to the passengers is very poor, the problem arises was to obstruct intruders from travelling the trains. So, to overcome these issues, here we are introducing computerised railway ticket booking and security (RTBS) system. This computerised RTBS system

introduces easy ticket booking without any time lag and ensures security for the passengers by avoiding intruders. In this system; the AADHAAR card UID number is linked with the RFID card and is issued for passengers. Since each RFID card has unique number, no fake railway tickets can be made and this RFID card can be used by the passengers for their life long journey. By using this we can take railway tickets directly from the RTBS system provided in the railway platform without any manual power and time lag (by avoiding queues). This RFID card incorporates with a travel account can be recharged using Debit Cards or recharge coupons whose values are input directly to a PC

interface. This card also ensures E-tickets for reservation and general classes. The RFID card readers are provided in each bogies of the train and various other centres where the people can confirm their tickets. Section II of this paper describes about one of the most important technology used in this project called the RFID technology. The section III of this paper is about the ZigBee Technology. The working and the block diagram of this project are explained in sections V&VI

## 2. RFID TECHNOLOGY

RFID stands for Radio-Frequency Identification which refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID device provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information. A significant advantage of RFID devices over the others mentioned above is that the RFID device does not need to be positioned precisely relative to the scanner.

RFID is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by and read at short ranges via magnetic fields. Others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHF radio waves. Battery powered tags may operate at hundreds of meters. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader, and may be embedded in the tracked object.

RFID tags can be passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of a RFID reader. A passive tag is cheaper and smaller because it has no battery. However, to start operation of passive tags, they must be illuminated with a power level roughly three magnitudes stronger than for signal transmission. That makes a difference in interference and in exposure to radiation.

RFID tags contain at least two parts: an integrated circuit for storing and processing

information, modulating and demodulating a radio frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal. The tag information is stored in a non-volatile memory. The RFID tag includes either a chip-wired logic or a programmed or programmable data processor for processing the transmission and sensor data, respectively.

## 3. ZIGBEE TECHNOLOGY

ZigBee is the only standards-based wireless technology designed to address the unique needs of low-cost, low-power wireless sensor and control networks in just about any market. Since ZigBee can be used almost anywhere, is easy to implement and needs little power to operate, the opportunity for growth into new markets, as well as innovation in existing markets, is limitless. Some facts about ZigBee are:

- With hundreds of members around the globe, ZigBee uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world.
- Consumer, business, government and industrial users rely on a variety of smart and easy-to-use ZigBee standards to gain greater control of everyday activities.
- With reliable wireless performance and battery operation, ZigBee gives you the freedom and flexibility to do more.
- ZigBee offers a variety of innovative standards smartly designed to help you be green and save money.

## 4. LIMITATIONS OF THE CURRENT SYSTEM

- Difficulty in ticket issuing for a large crowd, this leads to rush and large queues in the railway station. Sometimes the passengers may not get his/her ticket for the particular train due to these queues and rush.
- Difficulty in stocking, distributing and accounting paper tickets.
- Now a days we have E-ticket booking facilities, but this facility is limited only up to reservation compartments.
- Security problems arise due to intruders.
- Issues arise due to illegal copies of tickets.

**5. WORKING OF THE PROPOSED SYSTEM**

The proposed system demands the requirement of RFID cards for all the people travelling in the train. Each user has a unique RFID card and is valid only for that particular user. Ticket booking is done at the RTBS systems placed at the railway stations and at different places of the city. Here the user is also provided with the options of checking his/her balance, recharging his/her travel account and to change their password. At the system, the RFID card showed by the user is identified by the card reader provided along with the RTBS system. Then the unique code linked with the database in the system gets updated. And the travel history of the passenger will be stored in this database for further references, if any. Rest of the process takes place at the compartment.

An RFID card reader is placed at the door of each compartment to check whether the card is valid or not. The validity of the RFID card and booking details are verified here by comparing it with the database transmitted from the RTBS system with the help of the ZigBee Txr and Rxr (Tarang Module). If the data compared is true and valid, the passenger is allowed to enter into the particular compartment. Here, we consider three types of compartments: Ladies compartment, Reservation compartment and General compartment.

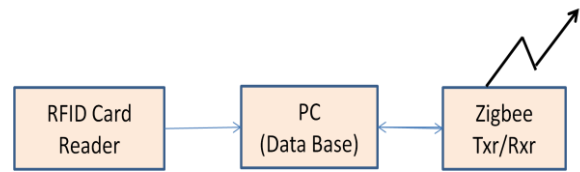
Both the Ladies compartment and Reservation compartment have the same working principle. These compartments are provided with automatic door locking system. When the valid card is shown, door opens. If the card is not valid, then the door will not be opened. Thus the unauthorized or the ticketless entry can be avoided.

In the general compartment, considering the rush, instead of the door locking system an alarm system with IR sensor is used. If a person without a valid card enters into the compartment and cross the IR field, an alarm will be heard and this information is send to the railway protection force (RPF) and nearby railway station.

**6. BLOCK DIAGRAM**

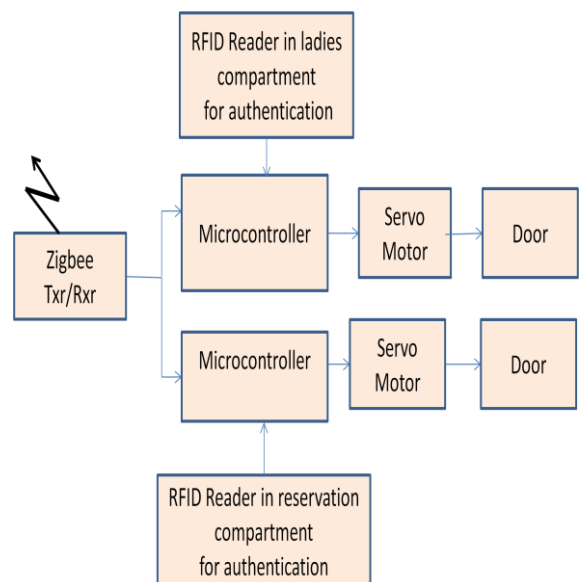
The Fig.1 shows the block diagram of RTBS system placed at the station, which includes a RFID card reader, database and a ZigBee

transmitter and receiver section. By using the ZigBee txr and rxr section, the data stored in the database will be transmitted to the system placed at each compartments and vice versa. The data base is created by the railway authority.



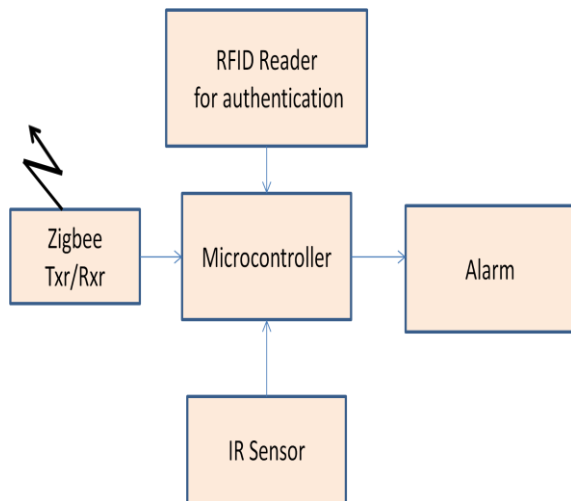
**Figure 1.** *At the station*

The Fig.2 shows the system placed at the ladies and reservation compartments. Here a RFID card reader along with the microcontroller is used for checking the validity of the passenger’s RFID card. And a door locking (servo motor and door) system is provided here to ensure the security for the passengers. The ZigBee module is used for fetching data from the data base placed at the station.



**Figure 2.** *Ladies and Reservation Compartment*

The Fig.3 shows the block diagram of the general compartment. Here an IR sensor and an alarm system is used to inform the railway authority, any invalid entry to the compartment. Similar to the ladies and reservation compartments a microcontroller module is used for checking the validity of the RFID card. And a ZigBee section is also used for fetching the data from the data base and vice versa.



**Figure 3:** General Compartment

## 7. ADVANTAGES OF THE PROPOSED SYSTEM

The advantages of the proposed system are:

- a. Each passenger is provided with a unique card for his/her life-long journey. Details of the user including his travel history can be recovered at any time through this service.
- b. Self-operated ticket booking and recharging mechanism.
- c. For foreign passengers, temporary cards are issued and are only valid till their visa period. Database of foreign passengers are created based on their passport details.
- d. The use of RFID cards reduces the paper (pre-printed tickets) consumption.
- e. Entry of intruders in the train will be avoided. Only passengers with valid RFID cards for the particular compartments are permitted to travel

## 8. APPLICATIONS

The same technique can be implemented in road transport. Also, RFID finds various applications in access management, tracking of goods, tracking of persons and animals, toll collection and contactless payment, machine readable travel documents, smart dust (for massively distributed sensor networks), tracking memorabilia to verify authenticity, airport baggage tracking logistics.

## 9. CONCLUSION

The computerized RTBS system provides easy ticket booking and also ensures security for the passengers. By using this system a passenger can easily confirm ticket from the system provided at the platform and also he can verify

his ticket using the system provided at each bogies of the train. Since the Adar card number is linked with the RFID card and each RFID card has a unique number, a passenger can use his RFID card for his life long journey through rail. By introducing a system like this we can avoid the usage of paper tickets and thus reduce the difficulty in procuring, distributing, stocking, issuing and accounting for such a large number of tickets. Thus, manual power can be reduced to an extent. This system also provides security for the passengers by avoiding intruders. Another peculiarity of this system is fake tickets can be avoided. If a person without proper ticket tries to get in the train, a warning alarm will be heard from the security system and also this information will be forwarded to the security center of the nearby railway station. Thus this system can overcome many of the ticket issuing and security system problems presently faced by the railway.

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