

# Automated Pantry Car system in India using RF module and GSM technology

Ganesh Pethkar, Swati Jadhav, Priyanka Dhumal, Pranav Bhosale, P. R. Ahir

**Abstract**— Indian Railways Pantry car system is still in practice of traditional method in serving food to the passenger which is time consuming and involves a lot of labor. In an average 15-20 persons works in pantry system, out of which only 5-7 persons are involved in making foods while the rest has to be in every bogie to receive and serve the order. In this present system, one person from the pantry car comes to every bogie at a fix time duration and narrates the pre-decided menu verbally and takes the order from every berth, then after some time order is served to the passenger. This whole process is time consuming and even after involving lots of labor, there is still confusion regarding the placed orders and their bill. To overcome this drawback and to make the pantry service automated, we have developed a user friendly wireless system to place the order from bogie unit and directly transmit the placed order to the pantry section. The user has to select the item from the menu displayed on the LCD, then have to fill Seat number, PNR number and his/her mobile number using keypad. One time password will be sent to the mobile number to proceed further. The purpose to enter mobile number is to make sure that the user places the order against his/her PNR and seat number only, so that no fake order is made and also to avoid the misplacement of orders. The user can make the payment either by card or by cash in our system. We have developed the whole system in smart phone also. The user with smart phone can place the order by using Bluetooth.

**Index Terms**— Pantry Car, Bogie, Bluetooth

## 1. INTRODUCTION

On 16<sup>th</sup> of April 1853, the first train started its journey of 53km from Mumbai to Thane. From that day, Indian railway is playing a crucial role in social and economic development of India. The Railway is the cheapest and the most affordable means of transport for millions of passengers in India. According to year book 2014-15, about 23 millions of passengers travels daily by train in India. Trains running over 1000kms or running above 10 hours are usually provided with the facility of pantry car. Even after a vast development in the era of electronics-telecommunication, still the Indian railway is using conventional method to serve the passenger.

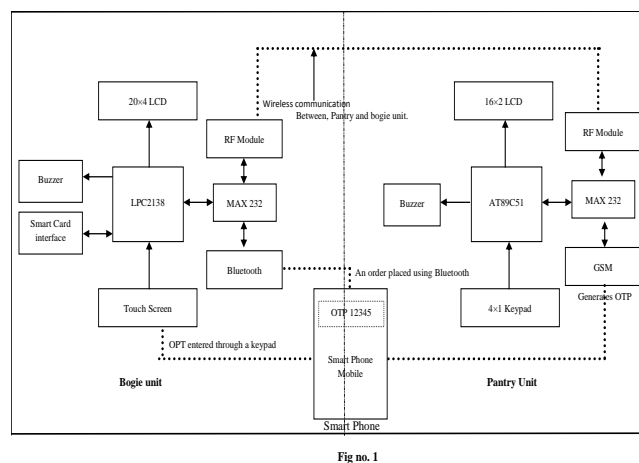
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## 2. EXISTING TRADITIONAL METHOD

In the current existing system, the pantry boy comes to every bogie at a fix time duration and narrates the menu verbally and makes a note of the placed order on the paper from every berth. This system is repeated in every coach, which is time consuming. Also in many trains, the pantry boy has to sit in every bogie unit, for a fix time duration, to receive the order from the passenger. Thus unnecessarily one pantry boy has to be seated in a particular bogie for the fix time duration, thus leading to many unnecessary labors than actually required in managing the pantry system. After taking the order, the pantry boy goes to pantry section and then the order is made which is served after 3-4 hours from the time of the placed order to the passenger.

Even after involving lots of labor and consuming many hours, this system gets involved in confusion regarding the placed order and their respective bills, which leads to the misplacement of order. Also, if the pantry boy comes late, the passenger left with no other option rather than waiting for the pantry boy to attain them. Also changing the price of an item on the menu card and adding a new item to the menu card is very tedious job. Many cases have been reported in which, fake pantry boy takes the order, cheat the passengers and take their money.

## 3.1 SYSTEM OVERVIEW



The entire block diagram is divided into three parts:  
1) Bogie Unit  
2) Pantry Unit  
3) Smart Phone

Before explaining the entire block diagram it is necessary to know the four categories of passenger in railway:

- 1] Passenger with smart card, but without smart phone.
- 2] Passenger without smart card and without a smart phone.
- 3] Passenger with smart phone, but without a smart card.
- 4] Passenger with a smart phone and with the smart card.

**\*Here smart phone means a mobile with Bluetooth connectivity.**

All the passengers travelling through the train fall in any of the above mentioned categories. So we have developed a system in such a way that the entire passenger with any possibilities will be able to place the order and get the benefits of pantry car.

	Smart card	Smart phone
Category 1	✓	X
Category 2	X	X
Category 3	X	✓
Category 4	✓	✓

Table no. 1

Explanation of block diagram with each category:

**Category 1: Passenger with smart card, but without smart phone:**

In this case, the user chooses the item from the menu displayed on the LCD and place the order through a touch screen keypad. After completion of the order, the user needs to fill his/her seat number, PNR number and mobile number. All this information is sent to the pantry unit through RF module. The GSM module placed in the pantry unit sends One Time Password [OTP] to the entered mobile number. The user has to enter the received OTP, to make sure that the order is made against his/her PNR number and seat number only and to ensure that no fake order is made. Once the correct OTP is entered, a buzzer turns on in pantry unit and then the person from the pantry unit sends the acknowledgement of the acceptance of the order to the user, at this point the buzzer of the bogie unit turns on. After this the user has to select the payment mode, either by cash on delivery or by the card. As the user is in category 1, having smart card, the user needs to swipe his/her smart card and the respective amount of the placed order is deducted from the account of the user. Thus, after some time, the pantry boy dispatches the order to the correct user.

**Category 2: Passenger without smart card and without smart phone:**

This category is same as that of category 1, the only difference is that the user does the payment after the delivery of the order. The provision of 'Cash on delivery' is provided in our system for those passengers who are not carrying smart card.

**Category 3: Passenger with smart phone, but without smart card:**

The users with the smart phone having a Bluetooth facility, only need to connect to the Bluetooth of the bogie unit to place the order. In this category the user will be able to see the menu on his/her mobile once the Bluetooth connectivity is gained. The user selects the item displayed on his/her mobile and enters his/her seat number, PNR number and mobile number and waits for the OTP. The user enters the OTP and when the person from the pantry unit accepts the order, the order confirmation message appears on the users Smart phone. After that the option for the payment will appear on the screen of the Mobile, payment; 'cash on delivery' or 'payment through card'. As the user in this category is not using smart card, the payment will be made after the order is served.

**Category 4: Passenger with a smart phone and with the smart card:**

The procedure to place the order is exactly same as discussed in the category 3, the only difference is that the user has to swipe his/her card to make the payment of the placed order. Every bogie unit will be provided with the smart card swiping machine to make the payment. Thus, after a few minutes the order will be served to the user and the user need not have to pay cash to the pantry boy.

*Major Components*

*Microcontroller*

We have used LPC2138 and AT89C51 in Bogie unit and pantry unit respectively to facilitate the communication between the various modules.

*GSM*

To generate One Time Password [OTP], we have used SIM 900 GSM module in our system.

*RF Module*

CC2500 RF module is used to establish wireless communication between bogie unit and pantry unit.

*LCD Display*

We used 20×4 LCD in bogie unit and 16×2 in pantry unit.

3.2 SOFTWARE USED

Before actual implementation of hardware we used Proteus Software for simulation of hardware design.

For microcontroller programming, we used Keil Software. In this software we compiled and executed the code file to generate the Hex file. After successful execution of code, the hex file was burned into the controller.

For PCB layout, we used Protel Software and for circuit designing we used OrCAD Software.

4. 1 RESULTS FROM IMAGES

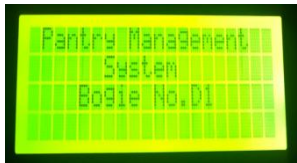


Fig no. 2



Fig no. 3

Fig no. 2 and fig no. 3 shows the initial message appearing on Bogie unit and Pantry unit respectively.



Fig no. 4



Fig no. 5



Fig no. 4



Fig no. 5

The user can see the menu as shown in fig no. 4. After selecting item from menu the user has to enter his/her seat number, PNR number and mobile number.



Fig no. 6

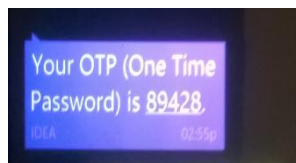


Fig no. 7

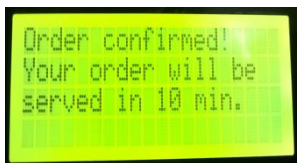


Fig no. 8



Fig no. 9

After entering the OTP received on the mobile, the confirmation message is displayed on the LCD on Bogie unit as shown in fig no. 8, then the user has to select the payment mode.



Fig no. 10



Fig no. 11

If the user chooses to make payment by card, the display on the LCD will be as shown in fig no. 10 or if a user chose the payment mode as, cash on delivery, then the display on the LCD will be as shown in fig no. 11



Fig no. 12

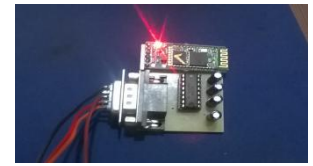


Fig no. 13

The entire procedure to place the order using smart phone having Bluetooth facility was also able to establish. Fig no. 12 shows the display of Smart phone, while placing the order.

4. 2 RESULTS FROM GRAPHS

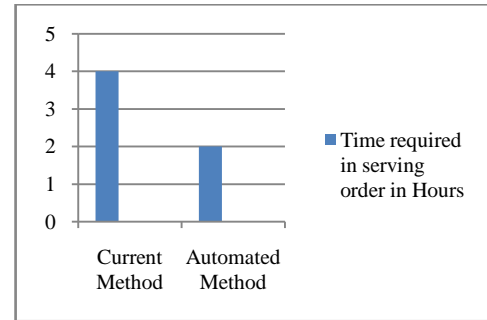


Fig no. 14

From fig no. 14, it can be seen that the time required in serving order is reduced drastically. Thus the automated system is able to reduce the time consumption.

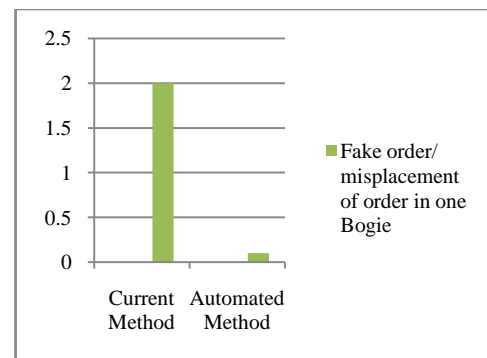


Fig no. 15

From fig no. 15, it is seen that the chances for misplacement of orders is reduced to a greater extent, this is because of using GSM to generate One Time Password [OTP], to avoid a fake order and misplacement of order.

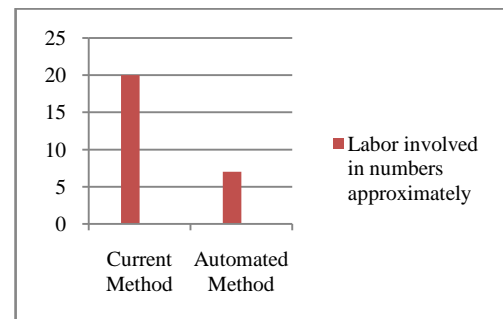


Fig no. 16

On an average about 15-20 labors are employed in Indian Railways pantry management system. Out of which only 4-5 labors are engaged in making food, while the rest of labors takes the order from passengers from each Bogie. From fig no. 16, it can be noted that the labor required is reduced, as the labor required to take the order from each coach is not required, as the passengers are able to place their orders directly to the pantry section using wireless technology.

## 5. CONCLUSION

From this paper, we tried to develop an automated pantry car system in Indian Railways, to minimize the efforts of labor and to reduce the time consumption in placing and serving the order. As this system is developed on a wireless platform, no cables are required, thus the installation of this system is easy, cost effective and requires low maintenance.

## 6. ACKNOWLEDGEMENT

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