RFID BASED METRO TRAIN SYSTEM

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***Abstract*: The main of this paper is to illustrate the technology used in metro train movements which are used in most of the developed countries. This train is equipped with a controller that enables the automatic stopping of the train from station to station. This paper presents the development process of a prototype for a driverless train implemented using a PIC microcontroller. Simulation for the system's circuits is done with the aid of Proteus software. The hardware circuits, which are built on printed circuit boards (PCB), are interfaced with actuators and sensors for automation purposes. The hardware is assembled in a toy-like prototype train. The C programming language is used for programming the microcontroller.**

***Keywords*- Microcontroller, DC Motor, RFID Reader, RFID Tag, GPS, Voice IC, LCD, IR sensor, Fire sensor, Buzzer, DC motor driver.**

I. INTRODUCTION

This project is designed so that students can understand the technology used in now-a-days driverless metro trains which are used in most of the developed countries like germany, france, and japan.These trains are equipped with the CPU which controls the train.The train is programmed for a specific path.Every station on the path is defined and also the stoppage timing of the train and distance between the two stations is predefined. This system is automatic and it doesn't requires any driver. Hence there is no possibility of any error. This system uses pic microcontroller for controlling the overall system. Station is automatically detected by IR sensor and according to that the train will stop. After stopping of the train , the doors will open automatically and passengers can go inside. Doors will remain open for particular interval of time as mentioned in the program.

II. PROBLEM DEFINATION

Many times because of human errors lots of accidents occurs. Secondly in electric trains fault occurring chances are more.So we decided to design a system which will avoid the overload problem. In previous systems the ticketing is done at the platform by using RFID tag ,which takes a lot of time. In this project, by using RFID and GPS to find theenter and exit location of the passenger. Using the location we can find the distance travelled and amount. The amount can be withdrawn from the card.

III. BLOCK DIAGRAM

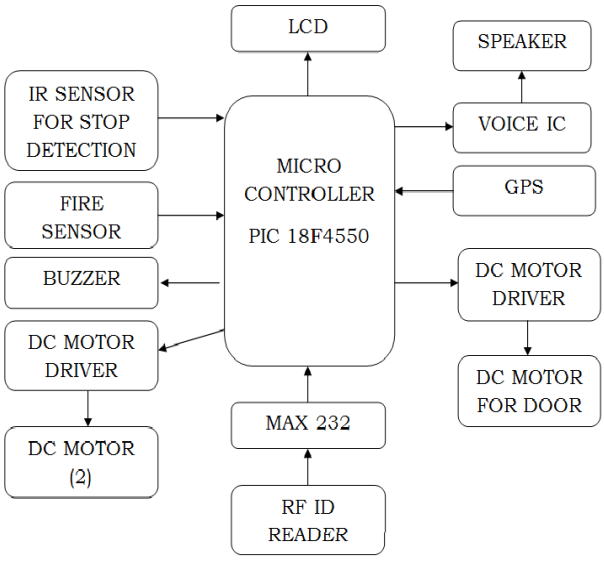

Fig. 1 Block diagram of RFID based metro train system.

IV. WORKING

This proposed system is automatic and it is driverless. Thus, there will be no any chance of human errors. In this projectpic microcontroller has been used for controlling. The ststion is sensed by an IR sensor and hence the train will stop automatically. Then the door is opens automatically so that the passengers can go inside the train. The doors will remain open only for the particular interval of time. The door closes when it reaches maximum capacity of particular section irrespective of time allotted for the door to remain open. The movement of the train is controlled by a motor driver IC interfaced to the microcontroller. Buzzer is used to alert the passengers before opening and closing of the door. As the train reaches the destination the process repeats thus achieving the desired operation.

Further the project can be modified by displaying the status of the train on the LCD display for the convenience of the passengers. The status of the train consists of the parameters like station names and number of passengers.

Voice IC is used for place announcement. The project consists of microcontroller with the voice recorder chip with speaker. The whole system is attached to the vehicle.

In this system we use the GPS for tracking the location of the passenger . According to that location fare deduction takes place automatically. By using RFID and GPS, we can find the location of the passenger enter and exit. Using the location we can find the distance travelled and amount. The amount can be withdrawn from the card. GPS and RFID card are interfaced with thePIC microcontroller that can be used to program this system. By implementing this system the usage of loose cash can be reduced and efficient ticketing can be implemented.

The RFID reader circuit is placed at the entry door and at the exit door . When the passenger enters the door , the passenger should swap the tag in reader circuit placed at the enter and exit door. The train's door will open while entering and leaving from the train's. The cost equivalent to the distance travelled by the useris hence calculated and the same is updated in the common database system.

When the tag is swapped into the reader circuit, reader reads the unique digital data behind it. Hence the tag reveals relevant information to the reader circuit. The reader circuit stores this information in its internal memory temporarily and also links to the common database system which has all the details of the particular passenger. If the information's are correct then the door will open. If the user don't have the enough balance then the alert tone will be given by the buzzer.

As mentioned previously, instead of each and every usermanually entering the point of entry and destination, the user just has to swap the tag into the reader circuitwhile entering and exiting at the destinationstation.It should be noted that the database system has programmed information regarding the fare deductioncorresponding to the distance travelled by the user .When the passenger swap the tag into the reader while getting down, the reader (which has previously stored the information regarding the same tag/user) equates the fare corresponding to the distance travelled by the passenger . Hence the fare corresponding to the distance travelled by the passenger is deducted from the user's account and the same is updated in the common database .

FOR LOST TAGS

As mentioned previously, each RFID tag has a unique id. The proposed system is designed that the user can be assigned with a new unique id if the person loses the tag. This can be done by the information provided by the user to the authorities. The authorities restore the information of the user in the database system to the new unique RFID tag which the user can use for their future transactions.

V. FLOWCHART

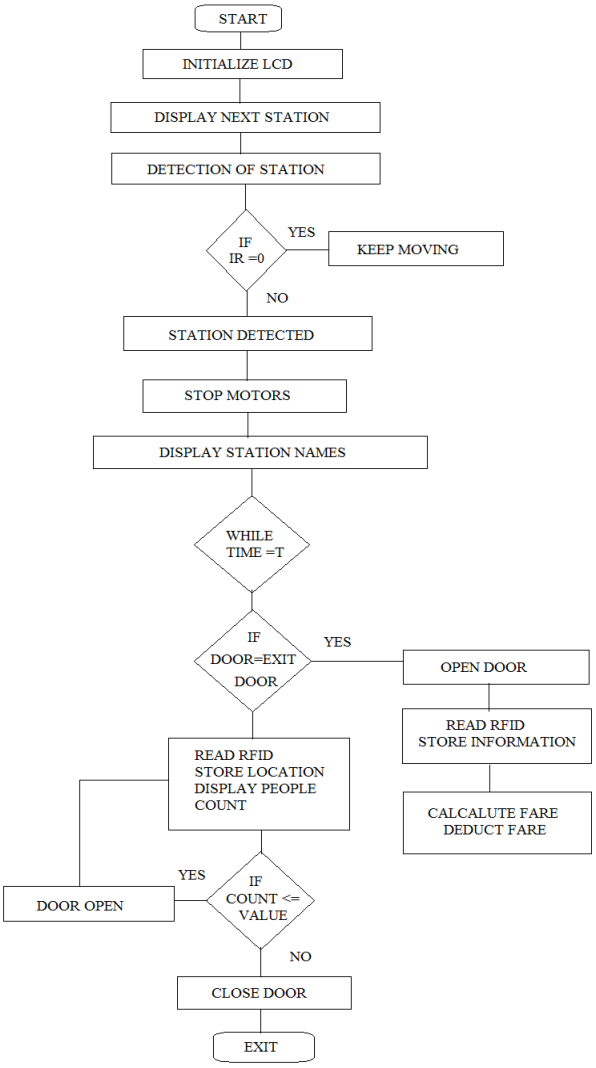

Fig. 2 Flow diagram of RFID based metro train system

Fig. 3 RFID reader and Tag

VI. RESULT

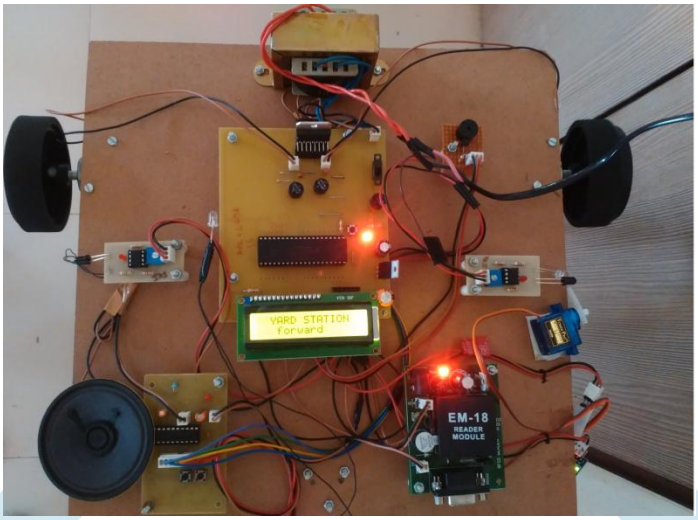

Fig. 4 Result of prototype hardware

We get messages on LCD like station name, number of people counting and status of train (Forward or Backward).Also moment of servo motor takes place when passenger swaps his card and depending on that, doors will be opened or closed automatically. Fare for distance travelled will calculate and deducted automatically which is also displayed on the LCD.

CONCLUSION

The expected aim of this project is to make an automatic system for stopping of the train from station to station using GPS. Automated metro lines are more energy-efficient and gives optimize passenger service automatically in real time. In terms of operational efficiency and cost-saving, driverless trains offer many advantages, such as lower expenditure for staff, avoiding human error and providing reliable auto metro train.

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