

Metro Train Safety and Ticket Checking System

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Abstract: Nowadays the modern technologies are helpful in all aspects of our life. Due to this lots of development done in the field of transportation. Thus it can be seen from the trending aspects of railways that they are primarily focusing on increasing the speed rather than SAFETY of the passenger. An efficient utilization of RFID with embedded system facilitate the smart ticketing in metro trains is proposed. This system explains the installation of RFID reader circuit in each and every train stations in metro rail to facilitate the calculation of ticket and passenger. So this system is useful to protect precious lives of passengers and minimize the heavy damages due to the fire accidents control. The objective of this paper is to design an Automatic Fire initiated braking and water pump system for trains. This system consists a microcontroller, motor, fire and smoke sensor, fan, and alert system.

Keywords: DC motor, metro train, IR sensor, Fire sensor, GSM, RFID module, Arduino uno.

1. INTRODUCTION

Accidents which include fire are one of the most dangerous incidents possible in trains. The rapid detection of a fire and its control can save several lives, thousands of injuries, and millions of rupees in property loss. The purpose of this paper to propose an 'Automatic Fire-Initiated, alert thicket checking Alert System is to detect an occurrence, alert the control panel and proper authorities, and notify the occupants to take action and make the train to stop and water pump is activated instantaneously.

The operation of the metro train is controlled by a central processor unit like Arduino controller, 8051 processor or PIC controllers. The intent of this project is ticket checking the metro train automatically with the help of sensors and safety of passengers is the basic concern of our model-based prototype metro train. The stoppage of the train on the stations is also predefined. The RFID sensors and RFID tags are used for checking of the ticket. The whole operation of the train is controlled and performed by a controller.

This project uses Arduino uno as the main controller of the whole system. The operation and control of the train are performed by the Arduino. The different operation or functions of the train is carried out by fetching the programs in the Arduino by using the Arduino IDE software

Some other additional features like LCD display to give messages to the passengers, GSM-based SMS facility to know the position or location of the train and give that information to the control center by SMS service. Fire to give indication to the passengers for LCD messages as well as for indication of door operation, automatic door controlling, passenger counting section by using IR modules.

2. RFID TAG

RFID tags are the components which are used for the purpose of identification. The tag has a sequential arrangement of metal pins. The most significant feature of this is the uniqueness exhibited by each of them. Depends on the power source applied to the tag and the maximum range, the tags are divided into:

a) Active tag: An active tag has an internal battery circuit that supplies power to magnetize the tag.

b) Passive tag: Passive tag is completely dependent on the reader for the required power. The major advantage of the use of these active tags is that these tags can broadcast the signals efficiently up to a distance of 100 feet whereas the latter is limited to a maximum distance of 200 feet. The tags can further be classified depending on the signal transmitted. The active tags transmit signals independent of the reader, whereas passive tags are completely dependent on the signal from the reader to transmit information. In most RFID tags contain at least two parts

i). First one is an integrated circuit for storing and processing information, modulating and demodulating a RF signal, and other specialized functions.

ii). Second is an antenna for receiving and transmitting the signal

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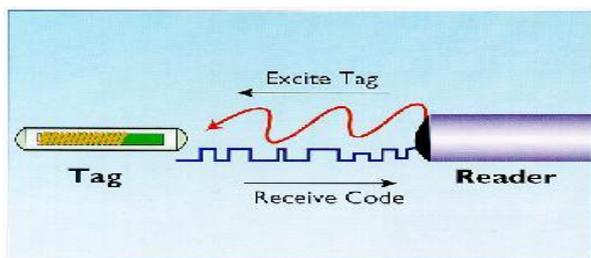


Figure . 1 Interaction between tag and reader

3. BLOCK DIAGRAM

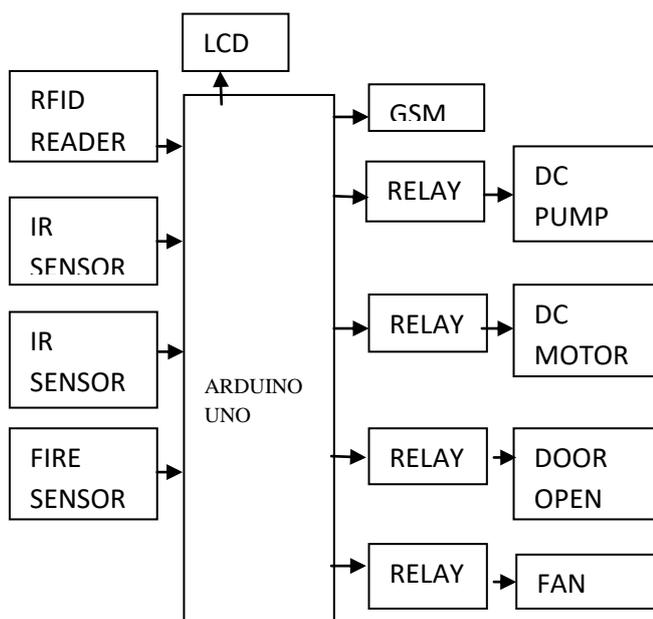


Figure .2 Block diagram of metro train safety and ticket checking system

4. PROPOSED SYSTEM

This proposed system is an automatic ticket checking and Passenger safety of the metro train. We have used Arduino uno as the main controller. The supply of 5V to the Arduino is given by a source like power bank. All the components which are used for the different operation of the train are connected to the Arduino.

At first, the train will get supply from a source and gets ready to move. Here we have used the 12V DC motor for giving supply to the water pump and door motor. But before that, the LCD will display the message that “The train will be fire and inform the station in few minutes”. The message will be send fire station and control station.

The passengers counting section came into action and count the passenger by use of IR modules and display it on the LCD. Then the LCD will display the message that “Doors are closing”. The state of the motor is changed from off state.

In this proposed system, the passengers need not to wait in the ticket counter to get the ticket. It saves the time for the passengers. By this system, we can reduce the fraudulent activities and accidents.

The role of any train conveyance system is to provide secure, consistent, efficient and high-quality service to passengers. As many transit lines run at or near their capacity limits, automation is often the only way to maximize the operative performance of a train service system. Applied on prevailing lines, mechanization is in many cases more remunerative than constructing new lines or increasing platforms

The passengers counting section came into action and count the passenger by use of IR modules and display it on the LCD. Then the LCD will display the message that “Doors are closing”.

When the train is arriving on the station, the LCD will display the message that “Train is arriving on the station in few minutes” with buzzer operation. The state of the motor changes from on state to off state by use of RFID sensor and RFID tags. RFID sensor is fixed on the train and RFID tags are fixed near the station.

By detection of RFID tags by RFID sensor, the train changes its state of motors from on state to off state. Then the LCD will display the message that “The doors are opening” and the door control will open the door. The whole operation of departure and arrival is repeated on every station during the train operation.

This project also contains some additional features like GSM based SMS service. We can track the position of the train by using this system and send the information to the control center by using this service.

The train stops and starts automatically and the doors are closed and opened automatically. The start/stop operation with respect to the doors open/close is performed repeatedly until there is any detection in object

This project also includes smoke detection via the MQ2 smoke sensor for the protection purpose. When there is some problem in the train due to system failure or electric shocks, smoke is produced which is detected by the smoke sensor and give the signal to the Arduino for protection of the train. It protects the train against fire as well as short circuits in the train.

This project also consist an emergency braking button placed on the train. It is used at the time of emergency for pply brakes on the train. We have also used vibration sensor for the protection purpose. When the emergency occurs in the train due to any type of failure, that causes vibration and so vibration sensor senses it and gives an indication to control center by GSM facility.

5. RESULTS

We have demonstrated this project by built a prototype model of driverless metro train. We have used DC gear motors and connected it to the wheels. A simple CD drive is

used for automatic door operation. A DC motor is used for door operation. It is to be noted that a buzzer will operate at every door operation function.

By running this prototype model we got results as getting messages like the name of the station, the number of passengers and door position on LCD display.

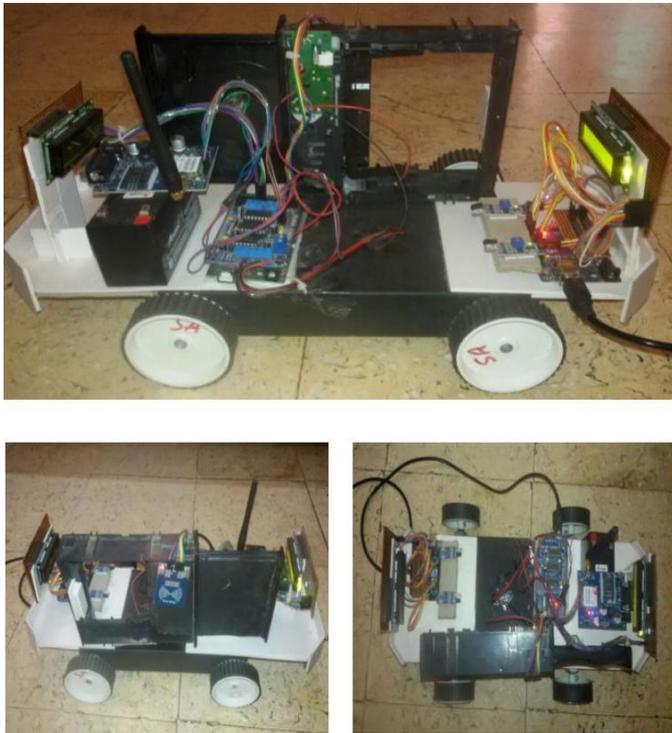


Figure .3 Prototype model of safety system

The speed of the motor is controlled by the motor driver IC and the supply to the motor driver IC and door motor is given by battery of 12 volts.

The door is automatically open and close with detection of the station by RFID sensors. There is some delay is provided between opening and closing of the doors by means of programming.

Detection of the station is done by sensing RFID tags by RFID sensor and it gives a signal to change the motor state from on state to off state.

The passengers will scan their tickets through the barcode scanner which will be there in the respective boogie and accordingly the ticket distribution systems located at various stations will be updated. The train on which station is detected by the RFID sensor by sensing the RFID tags on that station.

GSM system the passengers will scan their Ticket through the barcode scanner which will be there in the respective boogie and accordingly the ticket distribution systems located at various stations will be updated.

The vibration sensor has come into action when the vibrations in the train due to some fault are exceeded from the predefined limit. It sends the signal to Arduino and that signal can be sent to control center by using GSM module.

6. CONCLUSION

The train on which station is detected by the RFID sensor by sensing the RFID tags on that station. So we can get the location of the train on the particular station by GSM system.

The main focus of the paper is to apply the brakes to stop the train as soon as the fire is detected and send signals to driver and the guard so that they can take the necessary measures. Our metro train safety project provides the unique features like it provide fully automatic operation with less time, less consumption of electricity, smoke detection etc. The ticket checking system is the used to the RFID tag. The proposed system can also be implemented in other places like toll gates, bus ticketing and others It reduces the over. One advantage of this system is to transport more people than the normal metro train services. This system makes a better way to build smart cities as well as to provide better metro rail services to the society.

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