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Arduino Based Metro Train Controlling System

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ABSTRACT: As days are advancing we use technology in almost every part of our daily life. The transport system plays a major role in our daily life. The evolution of the metro train can be considered a huge improvement in the transport system. This influences the railroad to arrange the board framework. To overcome this problem we have a driverless metro train platform designed using Arduino and RFID which uses less power and operates securely. As it is a system based it mostly reduces the human mistakes caused. The RFID reader is used for detection. Then the door opens automatically so that the passenger can go inside the train. The numbers of passengers leaving and entering the train are counted by the passenger counting section. There should be a limit of passengers getting into the train then doors will be automatically closed. The passenger counts are displayed on an LCD display. LCD interface with Arduino. The C programming language is used for programming the microcontroller.

KEYWORDS: Arduino, RFID reader, Gas Sensor, IR Sensor, Buzzer, Motor driver, motor, Buzzer, LCD display.

INTRODUCTION

This project belongs to the IoT domain. It portrays a point of interaction of actual articles which are implanted with sensors and programming to associate and trade information. The government of India introduced this IOT policy in 2015. Several industries use this IOT policy like e-commerce, smart cities, smart homes, etc.

Many train accidents occur because of human errors. In electric trains fault occurrence is common. So this design will avoid these problems In the past framework, tagging was done on the stage which requires some investment. In this project by using an RFID reader train arrival can be detected.

This project is a driverless metro train. Here Arduino UNO, RFID reader, Motor, Motor driver, Buzzer, LCD, and IR sensor are used.

ARDUINO UNO: Arduino is the main microcontroller the operation of this train is controlled by Arduino. It has 6 simple pins and 14 advanced pins. Then it is 5v to work voltage of Arduino. The Operating voltage of Arduino is 5v. In 14 digital pins, 6 are given to pulse width modulation.

RFID READER: Radio recurrence distinguishing proof. It has at least one receiving wire that radiates radio waves. It is a type of tracking system, so an RFID reader is used to detecting the train arrived at the station or not.

MOTOR: The train's movement is controlled by the motor.

MOTOR DRIVER: The motor driver is an interface between the motor and the control circuit so that it turns low current to high current which can drive the motor.

GAS SENSOR: A gas sensor is used to check if any gas leakage in the engine area or any other harmful gases in the environment

IR SENSOR: The doors will open automatically using IR sensors and remain open for a certain period of time which was given in the program

LCD: LCD is used for the display of any inputs it is a 16x2 module that has 16 pins digital pins of LCD connected to Arduino



BUZZER: The buzzer is used for any emergency or it is used for alerting the passengers before opening/closing the doors.

In normal metro trains, there are many problems like there is no passenger count and as well as station names to display on LCD. Due to the absence of passenger count, there will be a heavy rush due to this heavy rush people cannot secure their health. To overcome this problem Arduino-based metro train using RFID was introduced. This was designed with Arduino and RFID reader. In this train instead of a driver RFID reader is been used that reduces human errors. On this train, there is no passenger count due to the limited number of passengers who will be entered. This helps people to secure their health.

II.LITERATURE SURVEY

Parkash rattan Tambar, and Chandra Jogi proposed a system titled A Driverless Metro Train using ARM7 (2015). This consists of ARM7 as a microcontroller. In this, we know how a metro train station. The limitation is it will only shuffle between stations but it will not provide information about station arrival. [1]

Prem Chand and Ratnesh Pandey proposed a system titled an Automatic metro train to shuffle between 2 stations (2015). It is a concept where passenger count is the main element, which is detected by 2 pairs of IR sensors and detection of train arrival through IR sensor. [2]

Hemang Jani, and Abhishek proposed a system titled Driverless metro train (2018). In this system, a PIC microcontroller is used to perform the entire task of a train without any human service. This includes the installation of an LCD for display purposes. The limitation is only a single controller operation can put passengers at risk. [3]

A.P.More, the Monali parade proposed a system titled Smart metro train (2018). It is a programmable setup using an ARM7 microcontroller. This RFID module is used for the ticketing system which allows passengers to go into the train. The limitation is it provides only tickets to passengers, but not about the train arrival. [4]

Bomdar bagel, Vinay kesharwani proposed a system titled Advanced mechanized metro train (2018) this system focused on passenger safety. Using IR sensors it monitors the temperature of wheels. The train will stop by the information delivered by the sensor. The limitation is if in case IR sensor is damaged it cannot stop the train. [5]

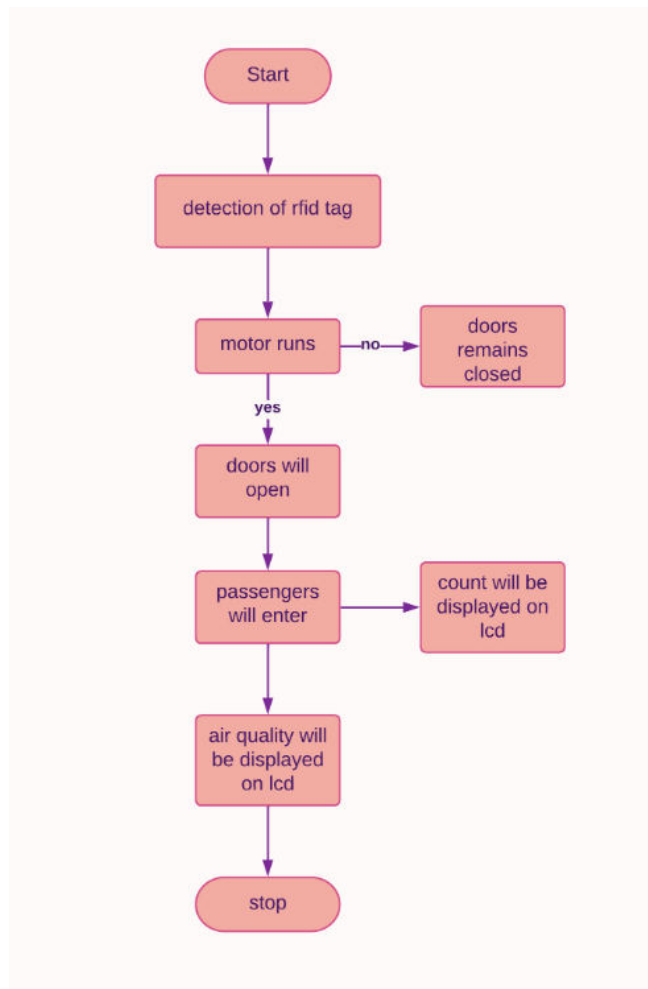
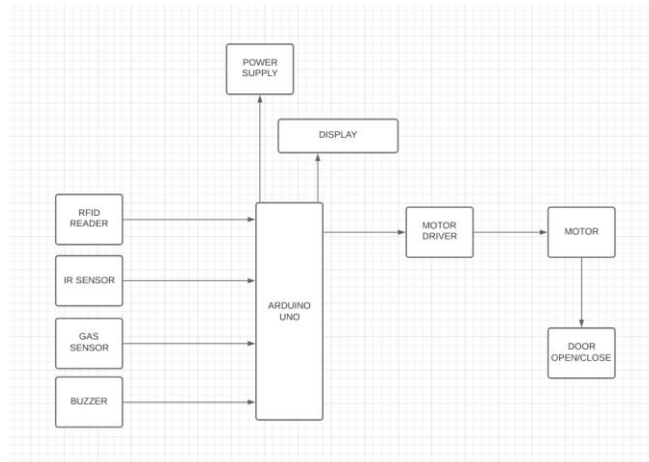
Thabit Sultan Mohammed, wisamfahmiazzo proposed a system titled Full automation in driverless train. This system is programmed to make a specific path. Announcements are auto-generated and are predefined. Simulation is done by using proteus software. [6]

III.PROPOSED SYSTEM

In this project Arduino UNO is used as the microcontroller, all the operations are done by this controller. It is completely a driverless train. By using this technology human errors will be reduced. Instead of a driver, we are placing RFID reader tags at the stations that are used to stop the trains when the train arrives at the station. In these trains, passenger count will be displayed on LCD and a limited number of passengers will be getting into the train due to this we can reduce the rush.

Block diagram of Arduino based metro train using RFID:

- Arduino UNO
- RFID reader
- IR sensor
- Gas sensor
- Buzzer
- LCD display
- Motor driver
- Motor



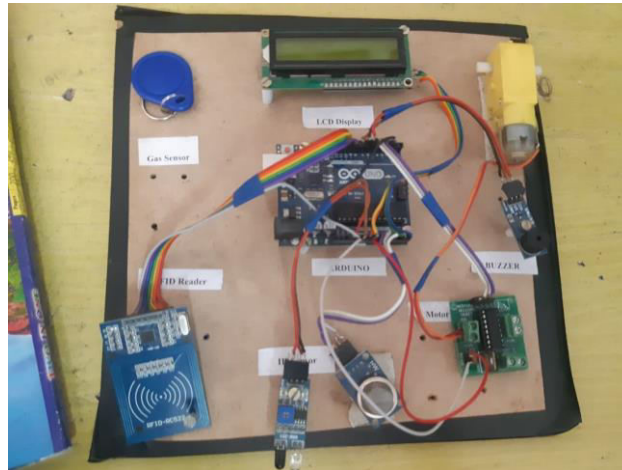
Flow chart of Arduino based metro train using rfid:

- 1) First start the system through the power supply.
- 2) RFID reader detects the RFID tag so that passengers can enter.
- 3) Motor starts running so that the doors will open automatically.
- 4) Passengers start entering, and the count will be displayed on LCD.
- 5) Doors are closed automatically.

- 6) A gas sensor is used to detect any harmful gases in the atmosphere.
- 7) Buzzer will on if it reaches the limit.

IV.RESULTS

In the expected output, when we first switch on the system we will get the phrase “WELCOME TO METRO TRAIN” on the LCD. Then after we need to scan the RFID tag with the help of an RFID reader. The IR sensor will detect only if



a person is standing in front of the door and then produce the buzzer sound. We can see the number of entered passengers count on the LCD display. Here the purpose of the gas sensor is to find any harmful gases in the surroundings and gives a reading on the LCD. We will get a buzzer sound for every passenger entry. The air quality will be displayed on LCD. The motor will start running when passengers enter as it indicates the door opening at the platform in this project.

V.CONCLUSION

So finally we conclude that the above project is completely real-time based which displays the passenger count, and air quality, which will be helpful for better transportation. This implementation brings together all the features which can be needed to make sure that the services provided by it make the system independent. It resolves the issues of crowdedness and human errors. This system makes a better way to build smart cities as well as to provide better metro rail services to society.

VI.FUTURE SCOPE

In future scope, we can use GPS module to get the train information whether it is in which station or at what time it arrives, etc. We can incorporate an automatic announcement system to inform the passengers about the next station. We can introduce RFID based ticketing system at each station.

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