

Automatic Metro Train to Shuttle between Two Stations

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Abstract: The primary of this paper is to show the innovation utilized in metro train developments which are utilized in the vast majority of the created nations. This train is furnished with a controller that empowers the programmed preventing of the train from station to station. This paper exhibits the advancement procedure of a model for a driverless train actualized utilizing a PIC microcontroller. Reenactment for the framework's circuits is finished with the guide of Proteus programming. The equipment circuits, which are based on printed circuit sheets (PCB), are interfaced with actuators and sensors for robotization purposes. The equipment is amassed in a toy-like model train. The C programming language is utilized for programming the microcontroller.

Keywords: Microcontroller, RFID, IR Sensors, D.C Motor, Train, IC, Station, Relay.

1. Introduction

This project is designed so that students can understand the technology used in now-a-days driverless metro trains which are utilized in the greater part of the created nations like Germany, France, and Japan and so on. These trains are furnished with the CPU which controls the train. The train is customized for a particular way. Each station on the way is characterized and furthermore the stoppage timing of the train and separation between the two stations is predefined. This proposed framework is a self-sufficient train and it takes out the need of any driver. Along these lines, any human mistake is discounted. In this venture PIC microcontroller has been utilized as CPU. At whatever point the train lands at the station it stops naturally, as detected by an IR sensor. At that point the entryway is opens naturally so the travelers can go inside the train. The entryway at that point closes after a recommended time set in the controller by the program.

2. Objectives

- This paper is proposed to show the innovation utilized in metro train movement which are utilized in a large portion of the advancing nations.
- This train is furnished with a controller that empowers the programmed running of the train starting with one station then onto the next.
- The goal of the proposed framework is an independent

train and it wipes out the need of any driver. Therefore, any human blunder is precluded. In this undertaking 'Arduino 382' has been utilized as CPU.

- At whatever point the train touches base at the station it stops consequently, as detected by an IR sensor. At that point the entryway opens with the goal that the travelers can go inside the train.
- It is furnished with a traveler checking area, which tallies the quantity of travelers leaving and entering the train. There ought to be a traveler limit for instance 20 travelers is the cutoff – after 20 travelers getting into the train the entryways will be consequently shut.
- The entryway at that point closes and the train begins after a recommended time (there will be a period set as of now with respect to how long the train will stop at each station) set in the controller by the program. The traveler checks and the stations are shown on a LCD show interfaced to the Arduino 382 board.
- The development of the train is constrained by an engine driver IC interfaced to the Arduino.
- The train fuses a ringer to alarm the travelers before shutting the entryway and furthermore caution them before gazing. At the point when the train achieves its next stop the procedure is being rehashed to accomplish its ideal activity.
- Further the work can be upgraded by making this framework further developed by showing the status of the train over a bigger showcase unit for the accommodation of the travelers. The status of the train comprises of the parameters like, expected entry and flight time and so on travelers. The status of the train comprises of the parameters like, expected entry and takeoff time.

3. Methodology

Metro train prototype is an Arduino based gadget. It is utilized in driverless metro train, which is utilized in a large portion of advancing nations. These trains are furnished with CPU, which control the chain. The train is modified for the particular way. Each station on the way is characterized; stoppage timing of the train and separation between the two

stations is predefined. The 230 volts is constricted by 9 volts by transformer. At that point it is corrected by the extension rectifier made up of diodes. At that point the 9 v is directed by 7805. 1000 miniaturized scale farad capacitor is utilized to channel the DC voltage. The LED joined to it checks the stream of intensity supply. In this venture we attempt to give a similar structure for this sort of trains. We are utilizing ARDUINO 382 as CPU. The movement of the train is constrained by the Stepper Motor, for showing message in the train. In our venture, we have utilized IR sensors, where at appropriate areas as for each station, an IR transmitter is arranged. While the other piece of the IR sensor, the recipient, is introduced on the train. At whatever point a train going between stations, deciphers a significant IR flag, it will begin its readiness to stop at the coming station.

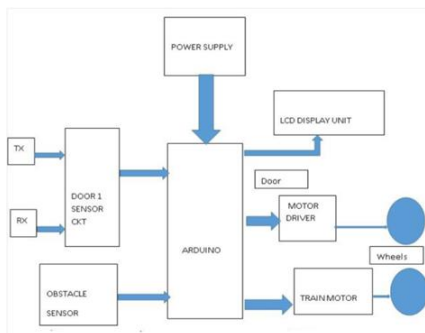


Fig. 1. Block outline of programmed metro train

4. Implementation

The job of any train transport framework is to give secure, steady, effective and superb administration to travelers. The same number of travel lines keep running at or close to their ability limits, robotization is frequently the best way to expand the employable execution of a train administration framework. Connected on winning lines, automation is by and large more profitable than developing new lines or expanding stages. The idea to prepare computerization can be legitimized by their different advantages: schedule of train activities become progressively precise and convenient, the recurrence of the trains can be improved, particularly in low rush hour gridlock hours, as more and trains can be embedded in rush hour gridlock without the requirement for increasingly operational staff, and the enlarged wellbeing, where the component of human blunder is taken out totally. In addition, automation can diminish the mileage of train by streamlining vitality utilization and capacitively decreasing the working expenses through progressively successful and normal train activity. In a completely programmed travel framework, care ought to be taken for every one of the procedures that are ordinarily requiring human cooperation. The underlying train takeoff, trips between two stations, timing of train stoppage at individual stations, and controlling the train entryways are instances of such procedures. Likewise, there are typically different exercises that ought to be robotized as well. The wellbeing frameworks speak to critical exercises that rebel

trains must have; like fire cautions with programmed putting out fires frameworks, detecting of any conceivable harm in the track and giving the data to the following train on a similar track just as to the base.

5. Result

A case of how inserted innovation is utilized in application, explicitly in the vehicle area is displayed in this paper.

- It is chipping away at Arduino. It's an automated train with sensors at both end.
- In the event that the train makes advances on the station it stops consequently at the station with the assistance of IR sensor implies that it has a programmed begin and stop game plan.
- At that point its check the quantity of people groups entering in the train. For example, there is the tallying sensor which include number of individuals entering in the train with timing sensor (for example sensor tally 20 people groups and there is timing sensor with 30 second).
- At the point when the people groups enter in the train the sensor check the no of individuals entering in the train, when tallying total the train entryway naturally shut or if in the 30 second the checking not finished the entryway will consequently shut.
- At that point the train begin to moving next station after either finishing the tally of 20 individuals or following 30 second.
- At the point when the train touches base at the predefined goal train stops naturally and the entryway of the train opens and afterward with the assistance of sensor again tallying begins for the general population who exit from the train and afterward it checks the quantity of individuals who enters in the train and in the wake of checking. The checking starts following 30 second and it's again move to next stations.
- It likewise has a hindrance sensor which decides the impediment quickly ceasing the train.

6. Conclusion

The driverless train that is system displayed in this paper is in fact a final year project. A general end that can be said about such building activities is that they are exhibiting understudies to an open skyline of improvements. Such activities can just speak to a minor piece of what the future and innovation coordination may look like for the modernization of various administration divisions including transport. Exploring and building up a working model improve fearlessness and guarantee that it is conceivable to plan a framework and apply it for taking care of a specific issue by obtaining the important data. In addition, building up a model framework can fill in as a premise of an unmistakably increasingly refined and advance type of control framework, for example, a genuine driverless

train framework. In this paper we have denounced how metro train can be robotized with the assistance of paper exhibited above and its primary favorable position is tallying the no of travelers consequently as they enter the train. This checking decreases the overpopulation inside the train. The depending then again is shown on 16*2 LCD show.

References

- [1] B.W.C. Cooke. "Proposed New London Underground". The Railway Magazine (London) 101 (648): 279–281. April 1955.
- [2] E. Fischer. "Justifying automation". RailwayTechnology.com. 23 August 2011.
- [3] S. Cappaert-Blondelle. Metro Automation Facts, Figures and Trends. The International Association of Public Transport (UITP). Technical report . Belgium. 2012.
- [4] J.M. Erbina, and C. Soulasa. Twenty Years of Experiences with Driverless Metros in France. VWT 19 proceedings. Dresden. 2003.
- [5] Transportation system division. The Dubai Metro, the World's Longest Fully Automated Metro Network. Mitsubishi Heavy Industries Technical Review Vol. 49. No. 2. June 2012.
- [6] S. HAN, S. LEE, W.KIM. Development of Onboard Train Automatic Control System for Korean Standard EMU. Processing's of the ISIE 2001 conference. 2001. Pusan, KOREA.
- [7] H. Jun, and S. Choi. Development of a Multi-train Operation Simulator with Interactive Human Computer Interfaces. International Conference on Hybrid Information Technology (ICHIT'06). 2006. Cheju Island, Korea.
- [8] M. P. Georgescu. Driverless CBTC – specific requirements for CBTC systems to overcome operation challenges. WIT Transactions on The Built Environment, Vol 88. 2008. pp. 401-409.
- [9] H. Yun, and K. Lee. Development of the Train Control System Data Transmission Technology Using a Wi-Fi Mesh. Proceeding if the ICTC 2011. Seoul. Sept. 2011. Pp.406-410.
- [10] M. Siemiatycki. Message in a Metro: Building Urban Rail Infrastructure and Image in Delhi, India. International Journal of Urban and Regional Research, vol. 30, pp. 289-92.
- [11] M. Verle. PIC Microcontrollers - Programming in C. mikro Elektronika; 1st edition, 2009.