

# Automatic Self Driven Metro Train with Disaster Management System

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**Abstract:** In this project we have implemented to demonstrate the technology used in metro train movements which are used in most of the developed countries enables the automatic running of the train from one station to another. In this we have proposed system which is autonomous train and it eliminates the need of any driver. Thus, any human error is ruled out. In this project we have microcontroller from 8051 family as a central processing unit. Whenever the train arrives to the station it stops automatically as sensed by a zigbee sensor. Then the door opens automatically so that passengers can enter inside the train and closes after a prescribed time set in the controller by the program the door closes when it reaches maximum occupancy level time allotted for the door to remain open. We have interfaced motor driver ic with microcontroller for the movement of the train. The train includes a buzzer to alert the passenger before closing the door and also warn them before starting. When the train reaches the destination station the process repeats by achieving the desired operation. It also provides fire detection system, if fire attacks in the train water is sprinkled automatically and the engine is dispatched and informs to the control station. The status of the train consists of parameters like, expected arrivals and departure time etc.

**Keywords -** Microcontroller, LPC2148, DC motors, LCD.

## I. INTRODUCTION

The automated system for a metro train is an integrated application makes announcements and displays the relevant station information when the train reaches a selected station. Serial communication, non-volatile memory storage, voice chip implementation et al. aid in bringing out the required functionality. This embedded application mainly focuses on overcoming loop holes within the prevailing system. It's optimized to satisfy the price and power consumption requirements. Modern technologies are being integrated in

most aspects of our life including transportation, where many advancement has been made. Rail road transport, as an example, has undergone a huge transformation, starting with the primary steam operated engines to the foremost recent bullet. Many developments in railroad transport has utilized the prevailing infrastructure, where the prevailing metro system is being modernized and equipped with automatic train control and safety system so on from them more efficient, a touch just like the train incorporates a buzzer to alert the passengers before closing the door and also warn them before starting, because the train reaches the destination the tactic repeats thus achieving the specified operation. It also provides Fire detection System, If Fire attacks within the train water is sprinkled automatically and informs to the Control Station. Many other railway lines are then automated with the aim of reducing operational costs and improving the frequency of service. In automatic train control systems, different grades of automation are incorporated. The grades of automation are like Semi-automated Train operation Driverless Train Operation, and Unmanned Train Operation respectively. Grades of automation are defined consistent with which basic functions of train operation are responsibility of staff, and which are the responsibility of the system itself.

## II. LITERATURE SURVEY

- [1] In paper entitled with "Advanced Mechanized Metro Train", Bomdar Bagra1, Vinay Kesharwani focused on passenger's safety so this prototype includes the features like collision avoidance with the use of ultrasonic sensor and AT-MEGA 328p as its important unit. It also observes the temperature of wheels using IR sensors. Based on the knowledge delivered by these sensor

systems the train will stop and avoid any accidents. The station announcements are completely automated.

- [2] In paper entitled with “Automated Metro Train to shuttle between two stations” ,Premchand bharti1, Ratneshpandey designed metro train concept during which arrived stations are often detected using IR sensors and automatic door closing and opening is achieved. The numeral of travellers boarding and de-boarding is supervised by 2 pairs of IR sensors.
- [3] In paper entitled with “Driverless ,Metro Train ” ,Hemang Jani and Abhishek proposed a Driverless metro system during which PIC microcontroller is employed to perform entire task of a train without assistance of any driver inside it. This includes the implementation of LCD screen which helps to display the passenger count. It also focused on reducing human errors , less power consumption and to provide and to provide comfortable safe journey to the passengers during travelling.
- [4] In paper entitled with “Smart Metro train”,A.P More, MonaliSarade [4] proposed a sensible metro train concept which is programmed using ARM7 microcontroller. It avoid the assistance of any driver to run the train. The prototype involves Radio frequency Identification module for ticketing system which allows the passengers to platform if their card is valid and relevant data is displayed on the LCD.
- [5] In paper entitled with “Estimation of Passenger Route Choice pattern using open-end credit data for complex metro systems” ,Juanjuan Zhao, Fan Zhang [5] established a proposal using Automated fare collection which helps to estimate how the passengers movements are forwarded to varied routes and trains. Since existing system works especially situations this paper getting to make the system to figure for sophisticated situations. This model estimates from empirical analysis how the passenger flows.
- [6] In the paper entitled with Field tests of an Long term evolution-based wireless Train Backbone in metro environments”, Igor Lopez, Javier Goikoetxea developed a wireless system in metro using Long term evolution and antennas operating in 5.8 GHz and required tests are performed using BOXPCS. It involves virtual coupling and train integrity as well. They have also indicated the dependency of the backbone performance with the reflections in the surrounding environment, due to the non-line-of-sight link between the antennas, as well as the limitations of operating in the 5.8 GHz band. As a result of these tests, future steps have been identified for achieving an operational railway Long term evolution backbone.
- [7] In the paper entitled with “Driverless Metro Train using ARM7”, Parkash Ratan Tambare proposed an idea to

make train system to driverless using LPC2148 from ARM7 family. This includes station’s announcements and automatic door terminating and opening. It has future developments for better metro train transportation.

### III. BLOCK DIAGRAM

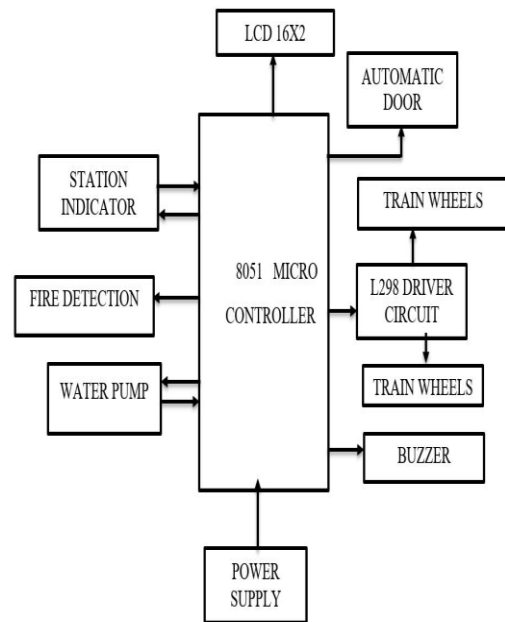


Fig.1. Block diagram of Automatic Self Driven Metro Train With Disaster Management System.

The working principle behind this project mainly based on the communication between the Trains and the Train stations, the train receives the signal from the station and train starts moving slowly compared to previous speed and micro controller stops the train, the station name can be displayed on the display using LCD which is of 16 rows and 2 columns (16x2), gives a buzzer before it opens the door after some time the buzzer starts sound indicating the door is going to close. The same procedure is sustained for all the stations. If the fire attacks in the train immediately water is sprinkled and dispatches the train engine

The L298 driver circuit is connected to the train wheels for the movement of train and to stop the train Using all this information railway personals can trace the location very quickly and act on it fast. A quick response can avoid a disaster. Since this system is fully automated it can be deployed anytime.

IV . DESIGN IMPLIMENTATION

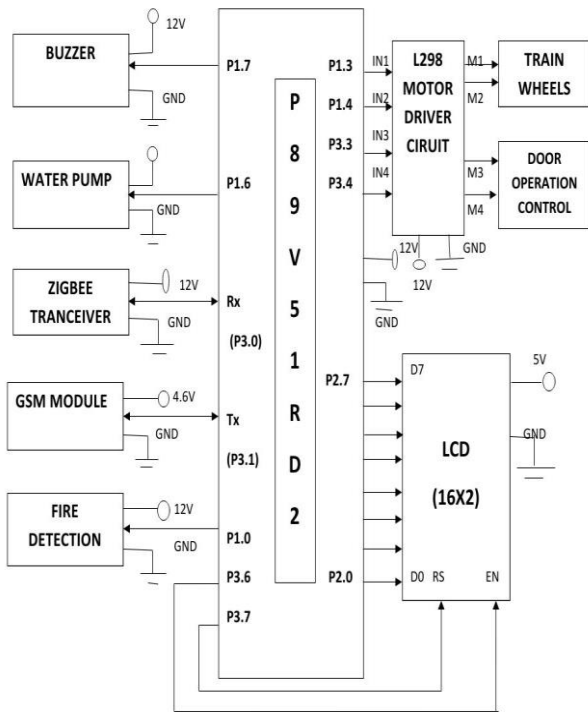


Fig.2: circuit diagram of Automatic self driven metro train with disaster management system.

V. FLOWCHART

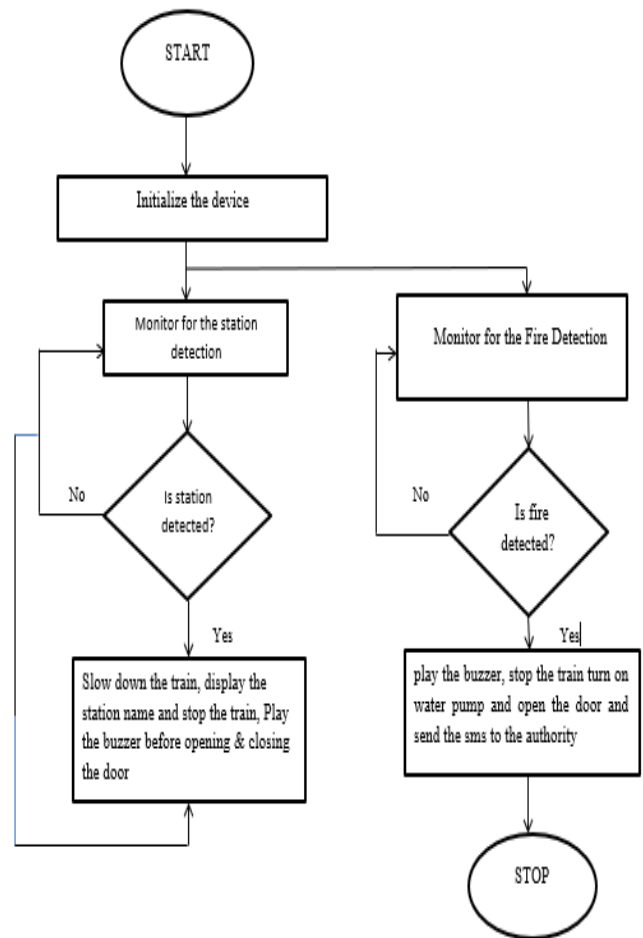


Fig.3: Flow chart train section of Automatic self driven metro train with disaster management system.

The hardware and software components used in this project are as follows:8051 microcontroller is a 8-bit 5v low power 64 kb Flash microcontroller with 1 kb RAM and is a industrial IC which withstands max power and gives accurate values. DC motors are 12v power supply, clockwise and anticlockwise rotation and it works fast as it receives the data from controller. Motor driver circuit is 12v, it will control the motor direction and controls the directions of the metro to control the speed of the train. Zigbee is 5v operating voltage, tx rx, gnd, and is used to send the commands to train & to receive the commands from station.Water Sprinkler is 5v operated to sprinkle the water. Fire detection sensor is 5v, tx rx led gnd, and it has range up to 1.5meters to detect the fire. Lcd display is of 5v,gnd with 16 rows and 2 columns to display the details of the events happen in the project. Power Supply is 220v,50hz input12v,2amps output to supply the power to the system. The software components used are keil microvision ,Flash Magic ,Embedded C, Eclipse and Software Development Kit.

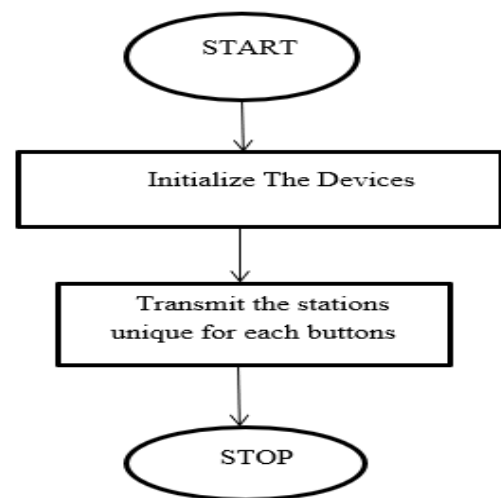


Fig.4: Station section of Automatic self driven metro train with disaster management system.

## VI. ADVANTAGES

It is Driverless transportation so that avoids the human Errors.  
It Saves the passengers when Fire attacks to the train by sprinkling the water.  
It has Easily available resources.

## VII. RESULT

The designed automatic self driven metro train with disaster management system is shown in below figure. All the sensors are interfaced with the arduino boarded. Project is designed and demonstrated the technology used in metro train movement which are used in most of the advanced countries. The train provides a controller, that enables the automatic running of the train from one station to another. The proposed system is autonomous train and it eliminates the need of any driver. Thus, human error is ruled out.



Fig.5:Automatic self driven metro train with disaster management system hardware model.

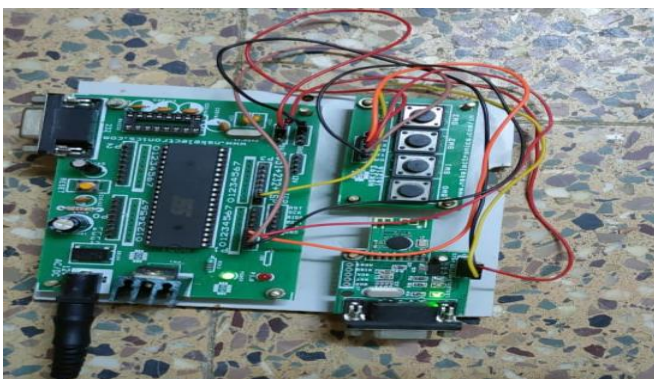


Fig.6.:Transmitter zigbee model.

## VIII. CONCLUSION

When the train enters into the station the train stops and buzzer is raised as doors are going to be opened automatically and doors remains closed after the interval of time at all the stations. If fire attacks in the train then water sprinkles automatically and informs to the control station ,then Control station head can request the train system for the location and system will automatically responses to send the location then further operations are carried by Station head such as informing to the Fire Department and Hospital.

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