

Auto Metro Train to shuttle between the Stations (Smart Metro Train)

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Abstract: The main aim of this paper to make a driverless train which is programmed to run between two stations. This proposed system is an autonomous train and it eliminates the need of any driver. Thus, any human error is ruled out. In this project microcontroller ARM7 has been used as CPU. Whenever the train arrives at the station it stops automatically, by using potential divider circuit analysis. Then the door is opens automatically so that the passengers can go inside the train. The door then closes after a prescribed time set in the controller by the program. It is also equipped with a passenger counting section, which counts the number of passengers leaving and entering the train. The door closes when it reaches maximum occupancy level irrespective of time allotted for the door to remain open. The passenger counts are displayed on a seven segment display interfaced to the microcontroller. The movement of the train is controlled by a motor driver IC interfaced to the microcontroller. The train incorporates a buzzer to alert the passengers before closing the door and also warn them before starting. As the train reaches the destination the process repeats thus achieving the desired operation.

Keywords: Driverless Train, Passenger Counting, GSM Module, Track Detection, Full Automation

1.Introduction:

The automated system for a metro rail is an integrated application which make displays the relevant station information when the train reaches a particular station. It is optimized to meet the cost and power consumption requirements.

This proposed system is an autonomous train and it eliminates the need of any driver. Thus, any human error is ruled out. In this project PIC microcontroller has been used as CPU. Whenever the train arrives at the station it stops automatically, by using potential divider circuit analysis. Then the door is opens automatically so that the passengers can go inside the train. The door then closes after a prescribed time set in the controller by the program.

2.Related Work:

Existing vs Proposed work.

The proposed system overcomes the disadvantages and has the below mentioned merits:

- Automated system requiring less manpower.
- It uses a camera
- Display unit is provided
- Automatic closing of door is provided after the prescribed number of persons are entered.
- A wireless camera is interfaced for continuous monitoring.

3.Project Description

This project is designed to demonstrate the technology used in metro train movement which are used in most of the developed countries. This train is equipped with a controller, that enables the automatic running of the train from one station to another.

This proposed system is an autonomous train and it eliminates the need of any driver. Thus, any human error is ruled out. In this project microcontroller from 8051 family has been used as CPU. Whenever the train arrives at the station it stops automatically, as sensed by an IR sensor.

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The passenger counts are displayed on a [seven segment display interfaced](#) to the microcontroller. The movement of the train is controlled by a motor driver IC interfaced to the microcontroller. The train incorporates a buzzer to alert the passengers before closing the door and also warn them before starting. As the train reaches the destination the process repeats thus achieving the desired operation.

Further the project can be enhanced by making this system more advanced by displaying the status of the train over an LCD screen for the convenience of the passengers. The status of the train consists of the parameters like, expected arrival and departure time etc.

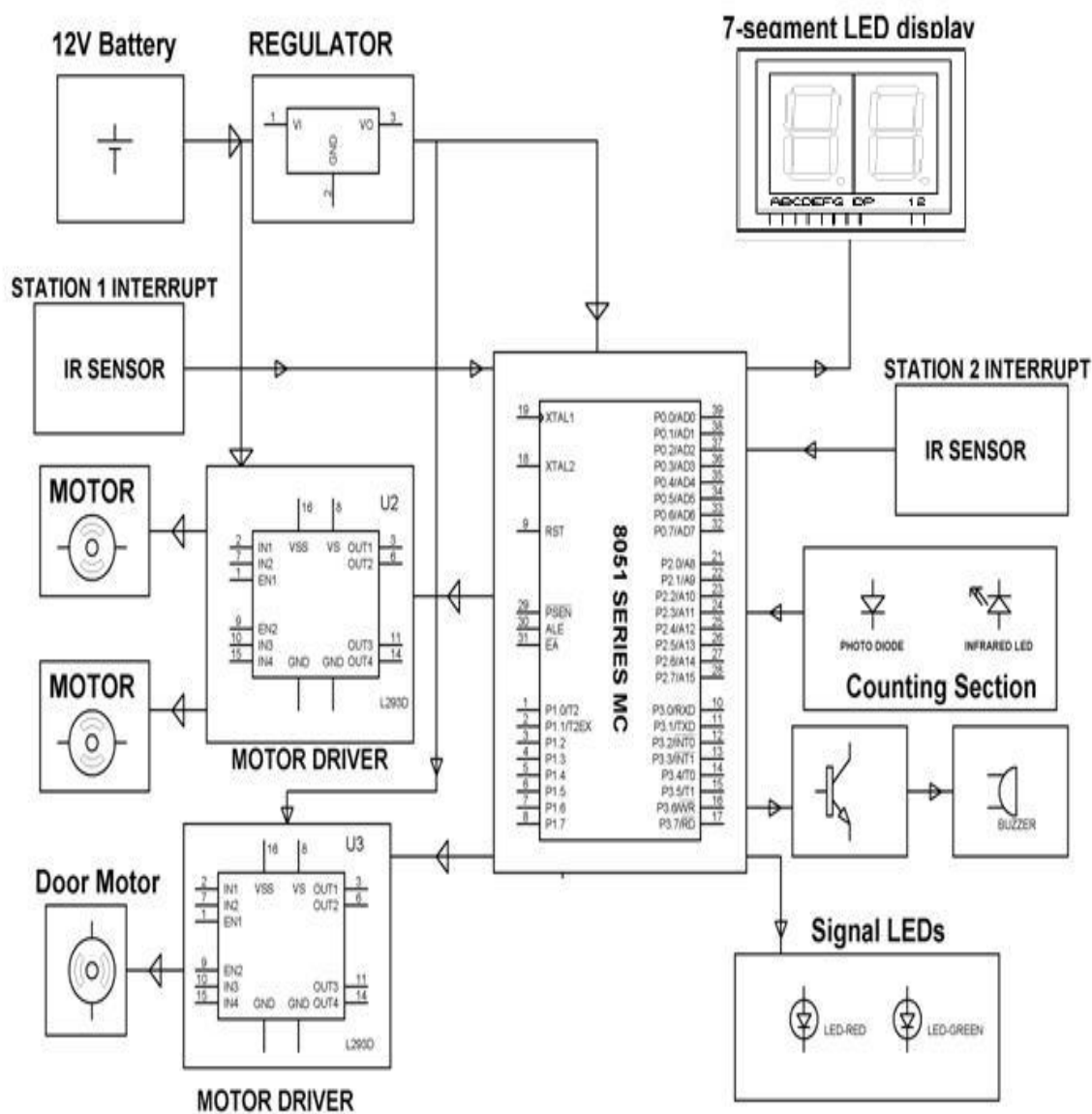


Fig: Block diagram of smart metro train

4.1 Hardware

- **ARM Controller:** An ARM processor is one of a family of CPUs based on the RISC (reduced instruction set computer) architecture developed by Advanced RISC Machines (ARM). ARM makes 32-bit and 64-bit RISC multi-core processors.
- **GSM:** (Global System for Mobile Communications) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation digital cellular networks used by mobile devices such as tablets, first deployed in Finland in December 1991.
- **Motor Drivers:** Motor driver is a little current amplifier; the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.
- **DC Motor:** A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.
- **LCD:** LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.
- **IR Sensors:** An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

4.2 Software

- **Embedded C:** Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.
- **Kiel M Vision:** μ Vision IDE combines project management, run-time environment, build facilities, source code editing, and program debugging in a single powerful environment. μ Vision is easy-to-use and accelerates your embedded software development. μ Vision supports multiple screens and allows you to create individual window layouts anywhere on the visual surface.
- **J Tag:** JTAG (named after the Joint Test Action Group which codified it) is an industry standard for verifying designs and testing printed circuit boards after manufacture.

5. Result and Discussion

Metro train prototype so the problem of unman metro train. It makes journey hurt free, makes the journey safe. The unmanned metro train provides errorless services for human intervention. The metro train compartment capacity is predefined and is programed in the microcontroller to generate the warning signal which causes the compartment door to close when the train is full. There are people counting system at the entrance of the compartment door. it also provides more safety. The distance between two stations is predefined and the train will stop at the station for predefined time.

6. Conclusion

Nowadays the accidents of trains are increasing day by day. Of these major accidents are occurring due to human faults. A man can do a mistake but a programmed processor doesn't have a chance of doing error. This is the main reason behind this project. This is a highly advanced technology which is currently used in developed nations such as Japan, Germany, France etc. By using this auto metro train, the timings of the train will be exact and it avoids a lot of inconvenience to the passengers. This project will

greatly reduce the human intervention in the control of trains and hence saves a lot of time and money.

Thus, the project "AUTO METRO TRAIN TO SHUTTLE BETWEEN STATIONS" is greatly useful in all aspects.

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