

AUTO METRO TRAIN SHUTTLE BETWEEN STATIONS

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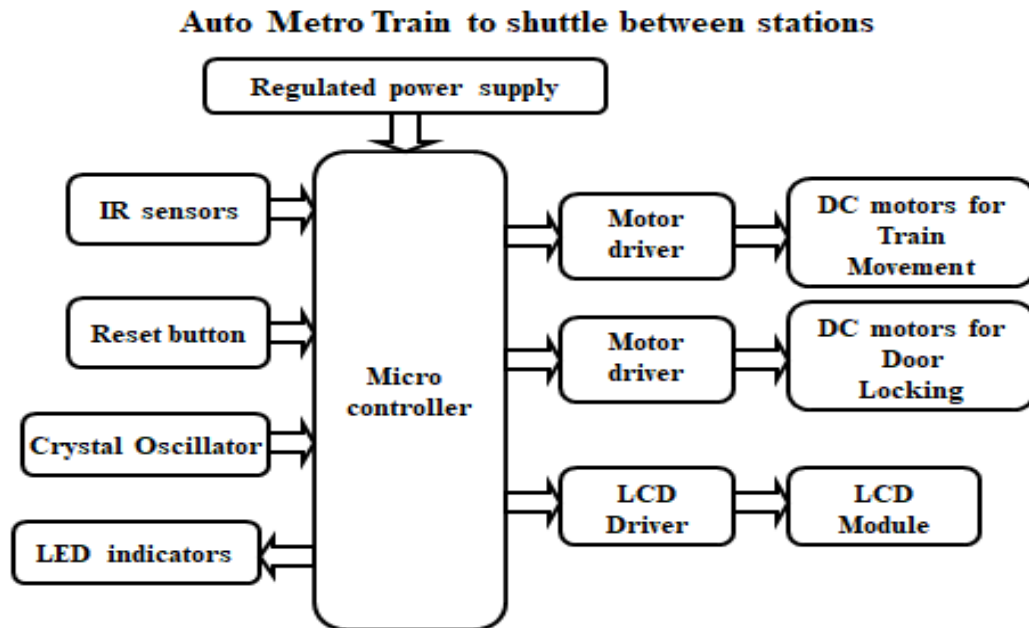
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ABSTRACT

In automating metro train the proposed autonomous train system is capable of detecting the station and automatically opens and the closes the door. The system also announces the station name over a predefined FM band frequency. The controlling device of the whole system is a Microcontroller. IR sensors, dc motors, voice circuit and FM transmitter are interfaced to Microcontroller. The IR sensors feeds the input to microcontroller and through this input it detects the station. The microcontroller stops the train once station is detected and automatically opens the door. The number of persons in and out is displayed on LCD this working happens for every station. To perform the task, Microcontroller is loaded with an intelligent program written using embedded 'C' language.

INTRODUCTION

This project is designed so that students can understand the technology used in now-a-days driverless metro trains which are used in most of the developed countries like Germany, France, and Japan etc. These trains are equipped with the CPU which controls the train. The train is programmed for a specific path. Every station on the path is defined and also the stoppage timing of the train and distance between the two stations is predefined. 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, as sensed by an IR sensor. 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.



OBJECTIVE

In this paper, part of this automation tasks are considered, and a microcontroller-based prototype is developed. Actions such as traveling through a given path with predefined stations, sensing the arrival at the station and hence, proper stopping are implemented in the prototype. Messages that are synchronized with the train's progression through its path are announced to passengers via a display. Moreover, alarm signals are produced as appropriate. Controlling of the doors in terms of open and close and timings of such actions are considered.

HARDWARE DESCRIPION

- Regulated Power Supply.
- Microcontroller.
- IR sensors.
- DC motor with driver.
- LED Indicators.
- LCD display.

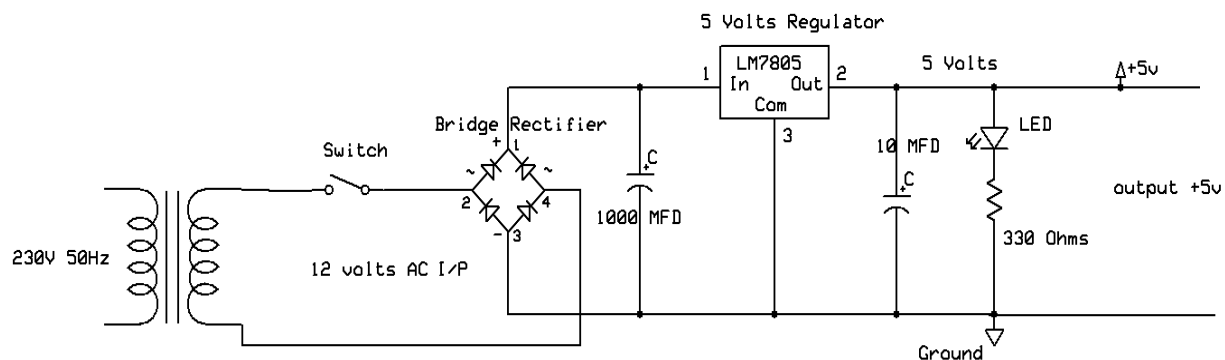
1.REGULATED POWER SUPPLY

Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

A power supply may include a power distribution system as well as primary or secondary sources of energy such as

- Conversion of one form of electrical power to another desired form and voltage, typically involving converting AC line voltage to a well-regulated lower-voltage DC for electronic devices. Low voltage, low power DC power supply units are commonly integrated with the devices they supply, such as computers and household electronics.
- Batteries.
- Chemical fuel cells and other forms of energy storage systems.
- Solar power.
- Generators or alternators.

REGULATED POWER SUPPLY



2.MICROCONTROLLER

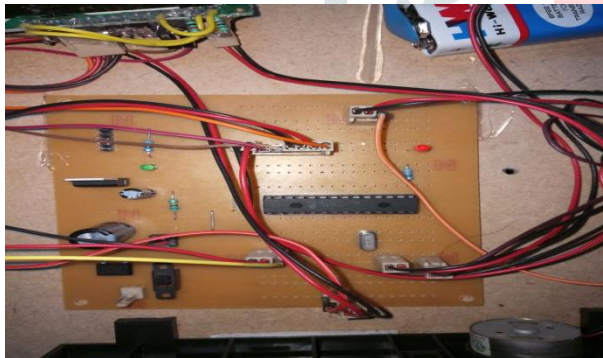
A Microcontroller is a programmable digital processor with necessary peripherals. Both microcontrollers and microprocessors are complex sequential digital circuits meant to carry out job according to the program / instructions. Sometimes analog input/output interface makes a part of microcontroller circuit of mixed mode (both analog and digital nature).

1. A smaller computer
2. On-chip RAM, ROM, I/O ports...

Example: Motorola's 6811, Intel's 8051, Zilog's Z8 and PIC 16X

General-purpose microprocessor

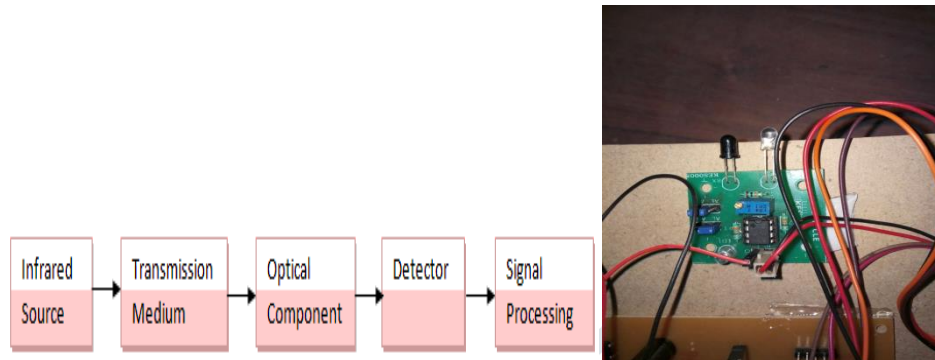
1. CPU for Computers
2. No RAM, ROM, I/O on CPU itself
3. Example: Intel's x86, Motorola's 680x0



3.IR SENSOR

IR sensors use infra red light to sense objects in front of them and gauge their distance. The commonly used Sharp IR sensors have two black circles which used for this process, an emitter and a detector (see image right). A pulse of infra red light is emitted from the emitter and spreads out in a large arc. If no object is detected then the IR light continues forever and no reading is recorded. However, if an object is nearby then the IR light will be reflected and some of it will hit the detector. This forms a simple triangle between the object, emitter and detector. The detector is able to detect the angle that the IR light arrived back at and thus can determine the

distance to the object. This is remarkably accurate and although interference from sunlight is still a problem, these sensors are capable of detecting dark objects in sunlight.



4.DC MOTOR WITH DRIVER

A DC motor is a electric motor that works on Direct Current (DC).Motor supply: 9-15V DC.

DC motor can be made to run in both directions by changing the supply polarities.

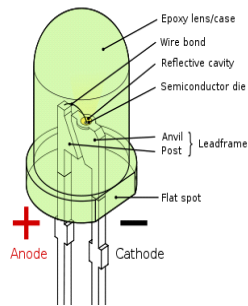
Microcontroller cannot run the motor in both directions and is not capable of driving the motor when it is directly connected to it.So, motor driver (H-bridge IC) is used as an interface between motor and Microcontroller.Motor driver used in the project is L293D (2 H-bridges



5.LED

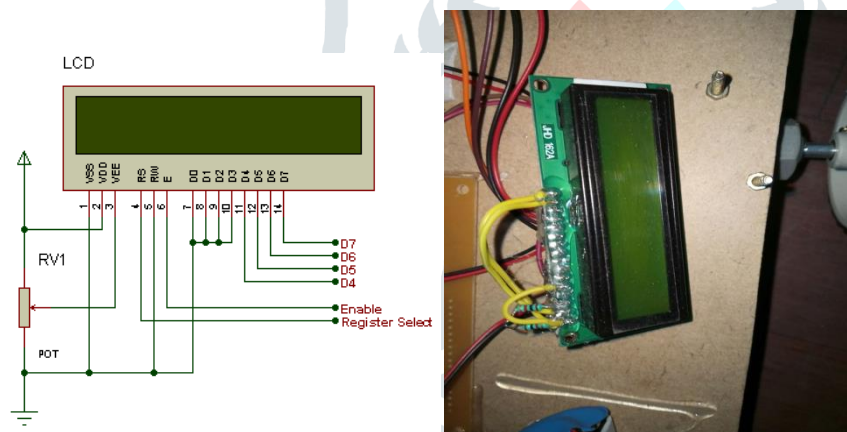
A light-emitting diode (LED) is a semiconductor light source. LED's are used as indicator lamps in many devices, and are increasingly used for lighting. Introduced as a practical electronic component in 1962, early LED's emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness.

The structure of the LED light is completely different than that of the light bulb. Amazingly, the LED has a simple and strong structure. The light-emitting semiconductor material is what determines the LED's color. The LED is based on the semiconductor diode.



6.LCD DISPLAY

One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively



ADVANTAGES

- These trains are significantly upgraded and ecofriendly
- These trains can run at a maximum speed of 95 kmph and operational speed is 85 kmph. Automated system requiring less manpower.
- Safer and less stressful way to travel.

CONCLUSION

The driverless train prototype that is presented in this paper is in fact a final year project. A general conclusion that can be said about such engineering projects is that they are introducing students to an open horizon of developments. Such projects can only represent a minor part of what the future and technology integration may look like for the modernization of different service sectors including transport. Researching and developing a working prototype enhance self-confidence and assure that it is possible to design a system and apply it for solving a particular problem by acquiring the necessary information. Moreover, developing a prototype system can serve as a basis of a far more sophisticated and advance form of control system such as a real driverless train system.

REFERANCE

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