Auto Metro Train to Shuttle between Stations

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Abstract- *This project is designed to demonstrate the technol¬ogy 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 ARM 7 has been used as CPU. Whenever the train arrives at the station it stops automatically, as sensed by an IR sensor. Then the door opens automati¬cally so that the passengers can go inside the train .It is equipped with a passenger counting section, which counts the number of passengers leaving and entering the train. There should be a passenger limit for example 10 passengers is the limit – after 10 passengers getting into the train the doors will be automatically closed.*

The door then closes and the train starts after a pre¬scribed time (there will be a time set already as to how many minutes the train will stop at every station) set in the controller by the program.The passenger counts and the stations are displayed on a LCD display inter¬faced tothe ARM 7. The movement of the train is con¬trolled by a motor driver IC interfaced to the ARM 7. The train incorporates a buzzer to alert the passen¬gers before closing the door and also warn them be¬fore staring. 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 alarger display unit for the convenience of the passengers. The status of the train consists of the parameters like, expected arrival and departure time etc.

Keywords- •LPC2148
•IR sensor
•DC motor
•LCD

•Camera 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. This embedded application mainly focuses on overcoming loop holes in the existing system. It is optimized to meet the cost and power consumption requirements.

EXISTING VS. PROPOSED SYSTEMS

Few disadvantages of the existing system are: •Constant human intervention.
• High cost.
• More Manpower is required.
• Installation and integration is time consuming. The proposed system overcomes the above 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.

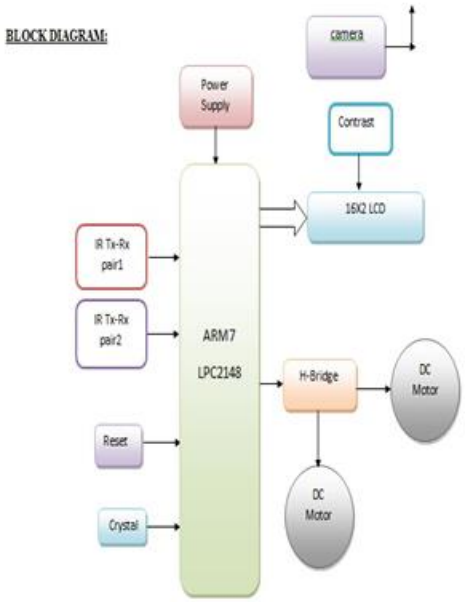


Fig1.0 Block Diagram

Fig 2.0 Metro Train

Material:

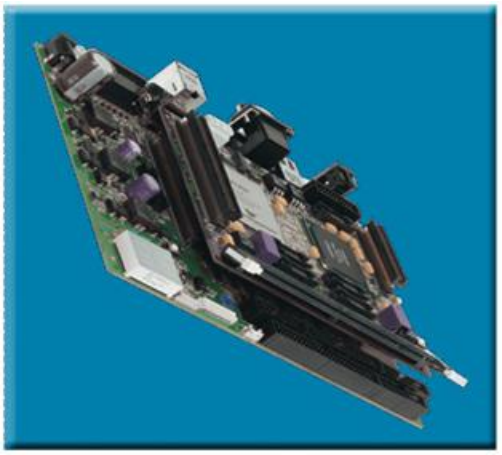
The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty.

With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

This project uses regulated 3.3V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

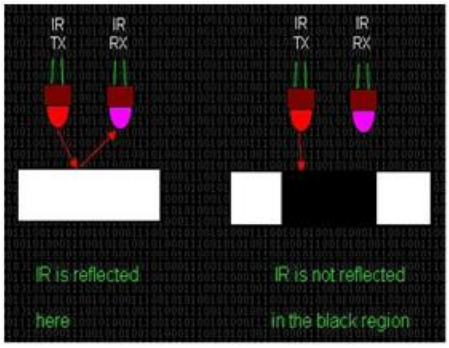
ARM PROCESSOR:



ARM7TDMI Processor Core:

•Current low-end ARM core for applications like digital mobile phones
•TDMI
oT: Thumb, 16-bit compressed instruction set
oD: on-chip Debug support, enabling the processor to halt in response to a debug request
oM: enhanced Multiplier, yield a full 64-bit result, high performance oI: Embedded ICE hardware •Von Neumann architecture

IR sensor: IR reflectance sensors contain a matched infrared transmitter and infrared receiver pair. These devices work by measuring the amount of light that is reflected into the receiver. Because the receiver also responds to ambient light, the device works best when well shield-ed from abient light, and when the distance between the sensor and the reflective surface is small(less than 5mm). IR reflectance sensors are often used to detect white and black surfaces. White surfaces generally re-flect well, while black surfaces reflect poorly. One of such applications is the line follower of a robot.

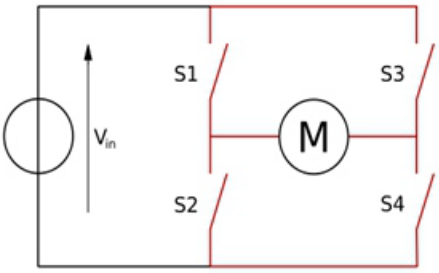


LCD: LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons: 1.The declining prices of LCDs. 2.The ability to display numbers, characters and graph-ics. This is in contrast to LEDs, which are

limited to numbers and a few characters. 3.Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.

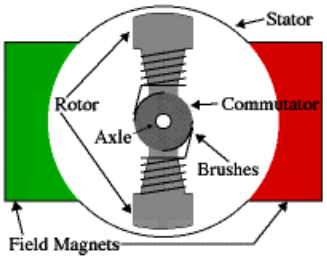
4.Ease of programming for characters and graphics. These components are "specialized" for being used with the microcontrollers, which means that they can-not be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

H-BRIDGE: An H-bridge is an electronic circuit which enables DC electric motors to be run forwards or backwards. These circuits are often used in robotics. H-bridges are available as integrated circuits, or can be built from discrete components.



The two basic states of a H-bridge. The term "H-bridge" is derived from the typical graphical representation of such a circuit. An H-bridge is built with four switches (solid-state or mechanical). When the switches S1 and S4 (according to the first figure) are closed (and S2 and S3 are open) a positive voltage will be applied across the motor. By opening S1 and S4 switches and closing S2 and S3 switches, this voltage is reversed, allowing reverse operation of the motor.Using the nomencla-ture above, the switches S1 and S2 should never be closed at the same time, as this would cause a short circuit on the input voltage source. The same applies to the switches S3 and S4. This condition is known as shoot-through.

DC MOTOR:



An electric motor is a machine which converts electrical energy into mechanical energy.

Principles of operation:

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel.

The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

Working of the project:

•Train moves with the help of motors fixed to the controller with the help of H-bridge.
•It goes to the station and stops there for particular time limit which is pre-programmed and then moves to the other place.
•The number of people coming inside will be counted with the help of IR sensor interfaced to the controller.
•If it exceeds particular limit then the train door gets closed.
•It also has a LCD as its display unit.
•A wireless camera is interfaced for monitoring purpose. So that the authorized person will can monitor.

Result:

Hence our project is implemented to run the train without driver within specified time limit and also using IR sensor which works on line of sight principle.

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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